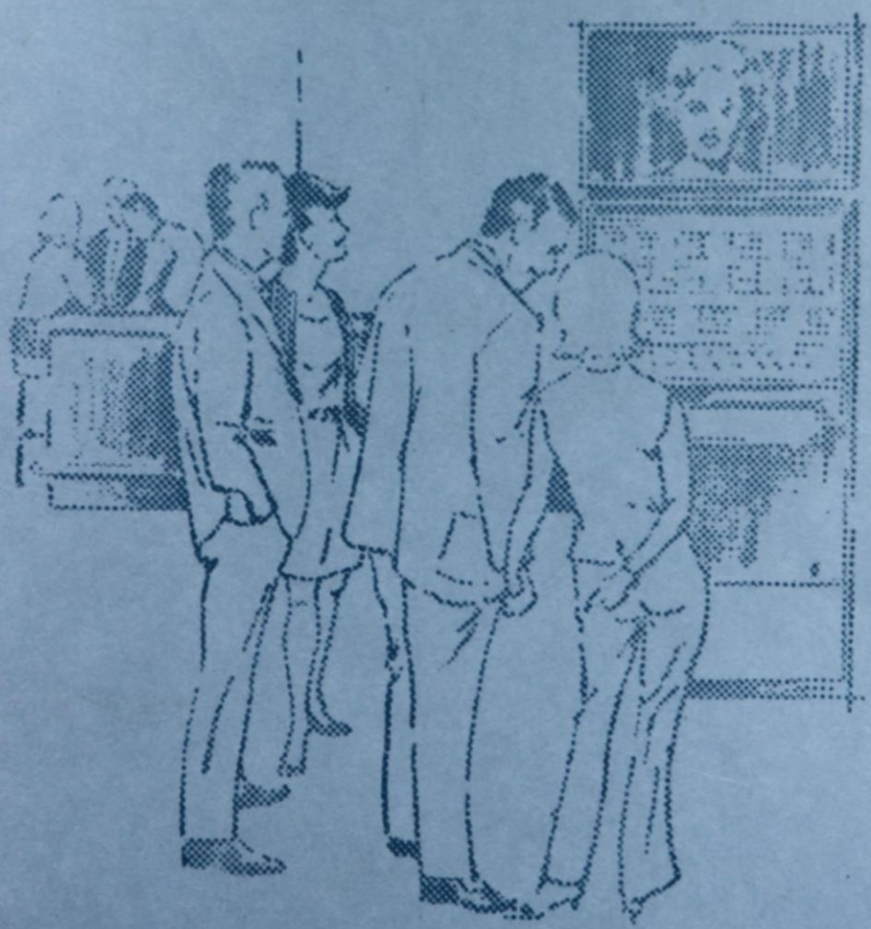
FIELD SERVICE MANUAL

COMBI-150

AUDIO-VISUAL ENTERTAINMENT CENTER



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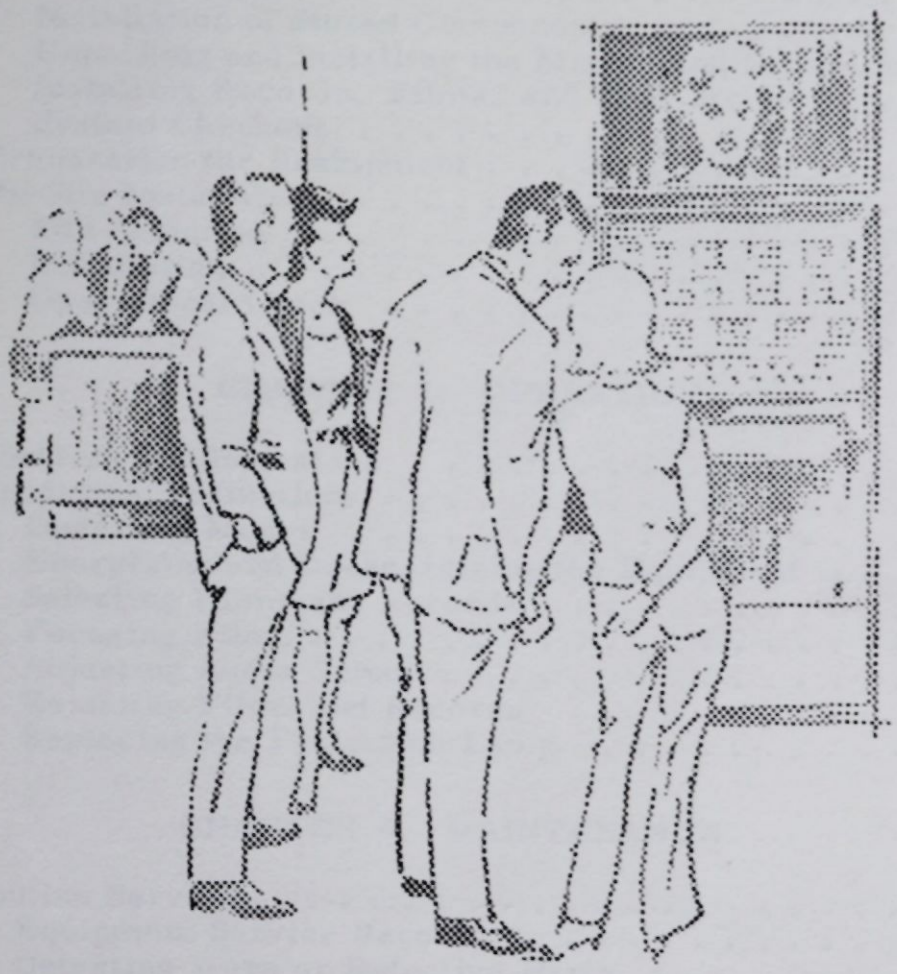

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31 AUGUST 1968

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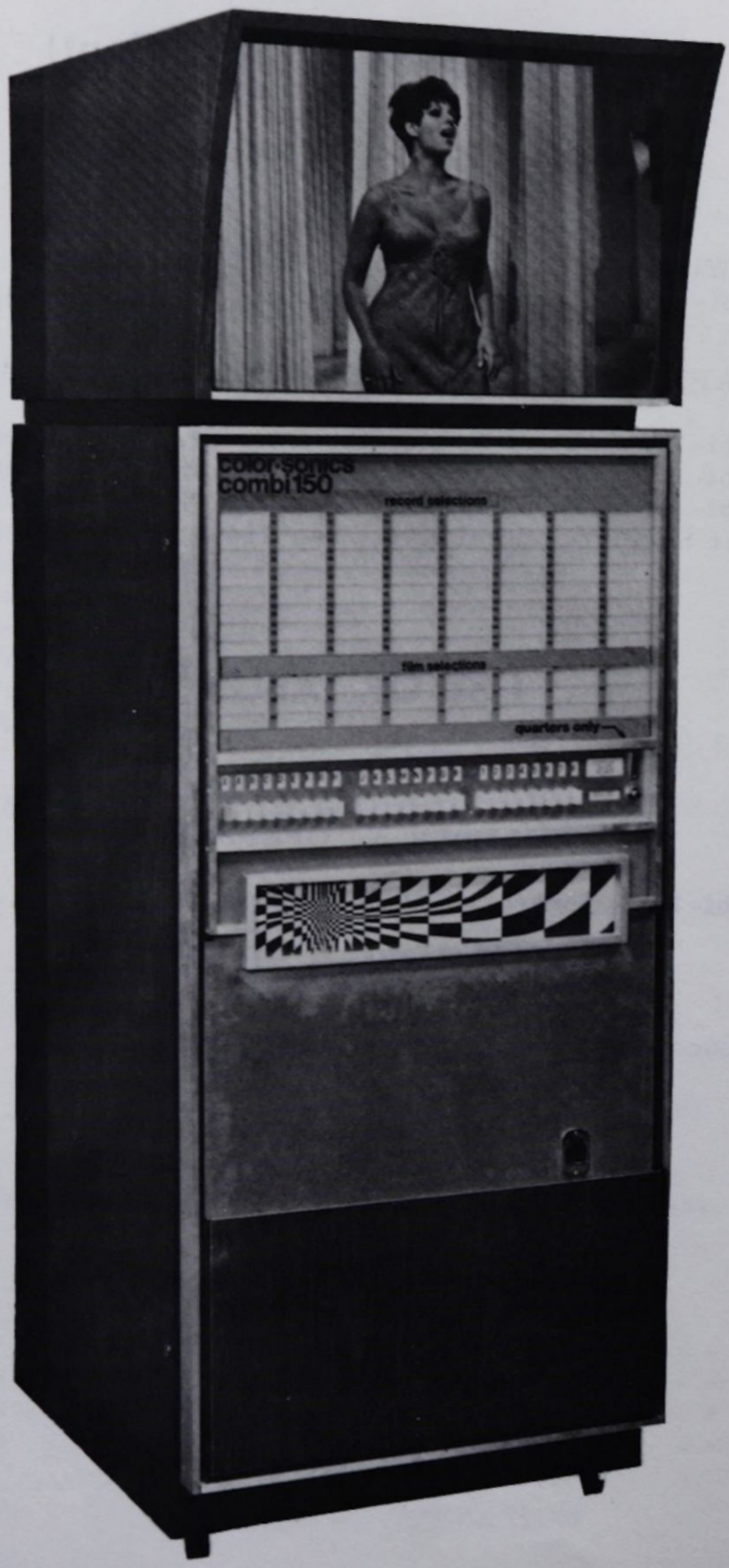


Figure 1-1. Combi-150, Audio-Visual Entertainment Center

CHAPTER 1
GENERAL INFORMATION

1-1. GENERAL. The Combi-150 (Figure 1-1) is a coin-operated, audio-visual entertainment center. Upon depositing a quarter, the user is afforded any one of the following options:

a. One 8-mm sound film

b. One 33-1/3-rpm long-play selection

c. Two 45-rpm selections.

1-2. The system's film capacity is 24 cartridges; its record capacity is 128 selections (64 records).

1-3. LEADING PARTICULARS.

a. Power Requirement: 115-117 vac, 60 Hz, 400 watts.

b. Dimensions: 29 inches wide by 39 inches deep by 86 inches high.

c. Weight: Approximately 550 pounds.

d. Video System: Consists of a modified Fairchild Mark IV projector deck; a 150-watt lamp with self-contained reflector; ventilating fan; a delivery system capable of automatically inserting any one of 24 film cartridges onto the projector; a memory system capable of storing all 24 selections; deflection mirror; 540-square inch screen.

e. Audio System: Consists of a preamplifier; two 21-watt, solid-state audio amplifiers; an output-matching transformer assembly; high-fidelity speaker system (one woofer, tweeter, and mid-range speaker for each channel).

f. Record Player: Consists of a record holder with a 64-record capacity; record player capable of playing both 33-1/3 and 45-rpm stereo or monaural records; memory system capable of storing all 128 selections.

g. Film Cartridge: Continuous loop, no rewind time; automatic loading and replacement without threading; five minutes maximum load per cartridge; 2500-play film life.

h. Credit Unit: Capable of storing 30 credits (15 quarters).

1-4. SPECIAL FEATURES.

1-5. The Combi-150 provides for automatic film and record selection through front-panel pushbuttons, contains two memory systems allowing any number of

the 24 films or 128 record selections to be preselected, contains provision for continuous jukebox mode of operation if film system operation is not desired, utilizes standard electrical components throughout, and requires no special cabling for installation. In addition, the major operating controls are contained in a compact unit (Remote Control Unit) that can be located external to the equipment.

1-6. GENERAL OPERATING PRINCIPLES.

1-7. The following discussion and Figure 1-2 provide a general understanding of system operation.

1-8. When a quarter is inserted into the coin slot of a de-energized Combi-150, it passes directly through the coin acceptor into the coin return slot. This is due to the coin lockout solenoid blocking the coin accept chute. Energizing the system causes the solenoid to pull in, opening the coin accept chute. An acceptable quarter passes through the coin mechanism, activates the coin accept switch trigger wire, and passes into the coin box.

1-9. Activating the coin accept switch energizes the add solenoid in the Credit Unit which pulls in and advances the accumulating gears two steps. In addition, the door-mounted coin counter is advanced one unit, the selection panel latch bar solenoid is energized, and the front panel SELECT lamp lights. The Power Supply/Control Unit switching and control circuits are now set up to process record and film selections programmed on the Selection Panel.

1-10. If a film is selected (for example, XL), the record player selection motor camshaft is cranked once, with the following results:

a. A capacitor in the film memory section, corresponding to the selected film, is charged.

b. The two-step subtract solenoid in the Credit Unit is activated and causes the accumulating gears to backstep two units.

c. The latch bar solenoid de-energizes, returning the selection panel keys to the undepressed position.

d. The film basket drive motor is energized and raises the film basket to its uppermost position. The motor is reversed, and the basket travels downward. During downward motion, contacts on the basket scan the film memory board contacts. When a charged capacitor is encountered, current flows through the contacts, discharging the capacitor and activating the film select circuits and film select solenoid.

The solenoid rocker arm engages and locks the film basket and the basket drive gears, and frees the cartridge drive gears. The cartridge is driven onto the projector deck and the play cycle begins.

1-11. The video portion is deflected onto a 540-square inch screen by a two-stage mirror system, consisting of a projector-mounted finger mirror and a large mirror mounted on the cabinet in back of the screen. The large mirror is adjustable for vertical positioning; the finger mirror is factory-adjusted for horizontal positioning. Focusing is accomplished by adjusting the lens, and picture brightness by adjusting the projector base mounted Brightness control.

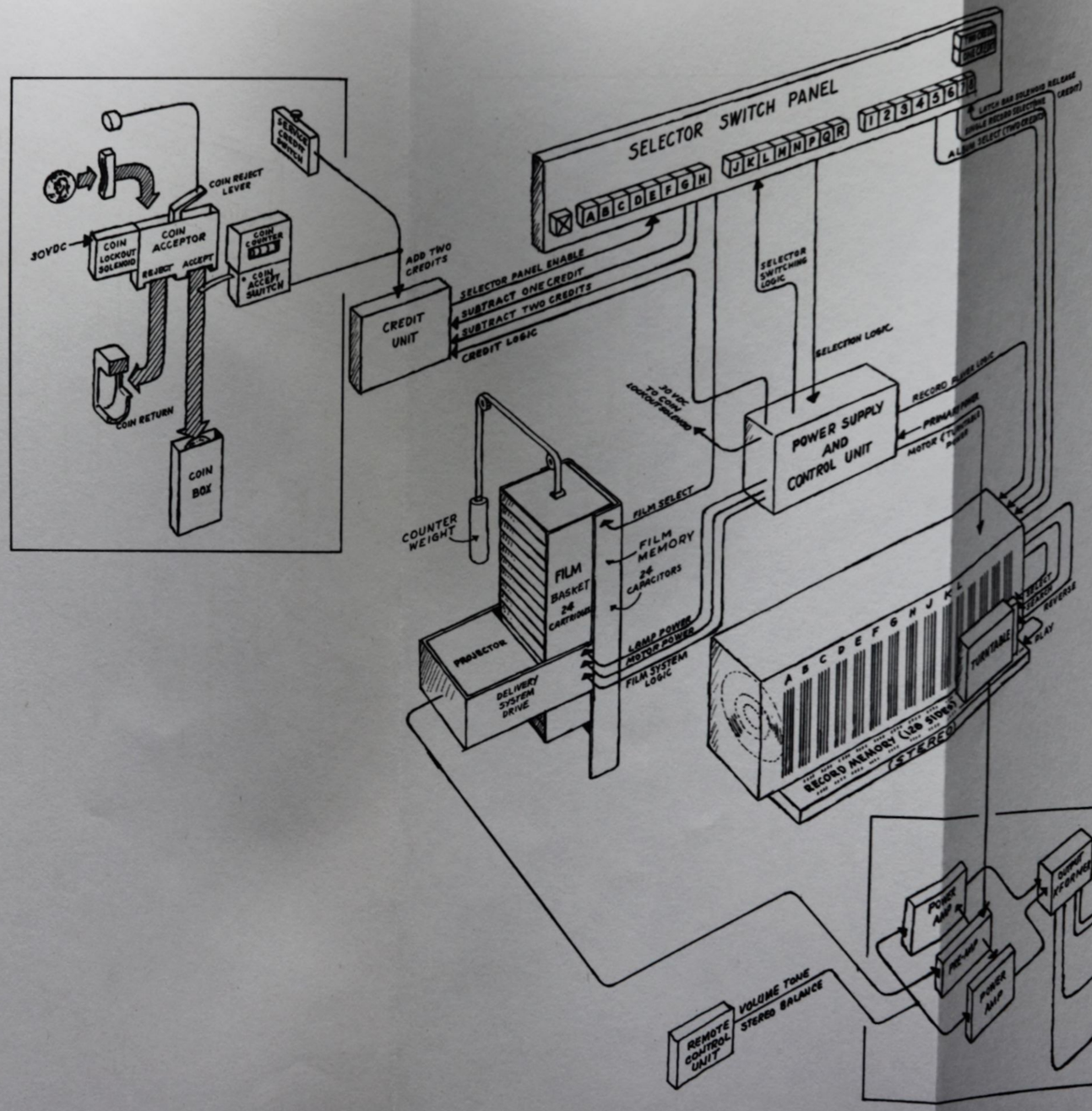


Figure 1-2. Combi-150, Simplified Functional Block Diagram

1-12. The audio portion is detected by a single-channel, magnetic-tape pickup head and fed directly to a preamplifier, where it is amplified and fed to two audio amplifiers. Each amplifier converts the low-level input to approximately a 20-watt maximum output. The output is fed through an output matching transformer to the high-fidelity speaker system. The transformer is a multiple-output-tapped device which allows for a variety of external speaker arrangements. Volume, tone, and stereo balance are regulated at the audio amplifier stage by the Remote Control Unit.

1-13. After a film completes its play cycle (when the end-of-film notch is detected), the cartridge drive gears withdraw the cartridge from the projector deck and insert it into the film basket. The film select solenoid rocker arm locks the cartridge drive gears and unlocks the film basket. The basket again elevates to its uppermost position, stops, and scans downward for further preselected films (charged capacitors). If the film memory is empty, the basket comes to rest at the bottom of the transport mechanism and the Combi-150 either assumes the stand-by mode, or scans for a record if one was selected.

1-14. If a record is selected, the selection motor camshaft is cranked once, causing the selection solenoid bar (containing one solenoid for each letter, A through R) to move laterally under the record memory bar (containing one pin for each selection, A1 through R8) and over the position contact board (containing one contact for each number, 1 through 8). Assuming record A2 was selected, the position solenoid (located above the position contact board) pulls in and locks solenoid "A" beneath record memory pin A2 when the solenoid bar contacts pass over position board contact 2. Solenoid "A" pulls in and pushes pin A2 up. Simultaneously, in the Credit Unit, either the one-step (for single selection) or two-step (for long-play selection) solenoid pulls in, causing the accumulating gears to backstep. The position and latch bar solenoids release, returning the selection solenoid bar and selection panel keys to their normal position.

1-15. A scan switch in the record carriage base closes in the second-step position, causing the record carriage head (turntable) to move laterally over the record memory bar. When the carriage head reaches the extreme left, its motor slows down and reverses direction. The head then scans to the right until it contacts raised pin A2, at which time it locks in place, and the following occurs:

a. Memory pin A2 is pushed down.

b. The tone arm is positioned to play the proper side of the record.

c. Selection A2 is extracted from its holder and placed on the turntable.

d. The white record popularity counter is advanced one step.

e. The turntable rpm rate is determined by the size of the record hole.

f. The tone arm moves onto the record surface.

g. The turntable motor slows down to playing speed.

1-16. The audio output is detected by a conventional stereo pickup and switched through the preamplifier to the two audio amplifiers. From this point, the audio is processed in a manner similar to that discussed under film play (paragraph 1-12).

1-17. As the record completes its play cycle, a magnet in the base of the tone arm closes a reed switch, coupling the play motor to the main camshaft. The camshaft rotates, causing the tone arm to withdraw from the record, the record to be returned to its holder, and the carriage head to unlock. The record carriage head then scans the record memory pins twice for further preselected records. If the record memory contains no further selections (raised memory pins), the carriage head comes to rest at the right edge of the record player, and the Combi-150 assumes the stand-by mode.

CHAPTER 2
INSTALLATION

2-1. INTRODUCTION. This chapter contains all of the information required for the receipt, assembly, and checkout of a Combi-150 at the distributor's facility, and the subsequent repacking, installation, and checkout of the system by the distributor at the operational site.

2-2. RECEIPT AND INSPECTION.

2-3. The Combi-150 is shipped in three containers (Figure 2-1). All packages will be inspected in the presence of the carrier for obvious damage. The packages will be opened (see WARNING note in paragraph 2-5) and checked for completeness of content, and equipment for damage in transit. Any obvious equipment damage, or container deficient in content, should be reported immediately.

2-4. UNPACKING AND ASSEMBLY OF EQUIPMENT.

NOTE

Retain all packing material and securing devices for possible future use.

2-5. REMOVAL OF MAIN CONSOLE FROM CONTAINER.

WARNING

The metal straps are wrapped around the large container under tension, and are likely to spring out when cut. To avoid personal injury, stand aside while cutting the bands.

a. Snip and remove the metal bands.

b. Remove the cardboard top and unwrap the five-sided cardboard cover.

c. Gently slide the Combi-150 off of the wooden platform.

d. Snip and remove the metal bands which secure the counterweight to the platform.

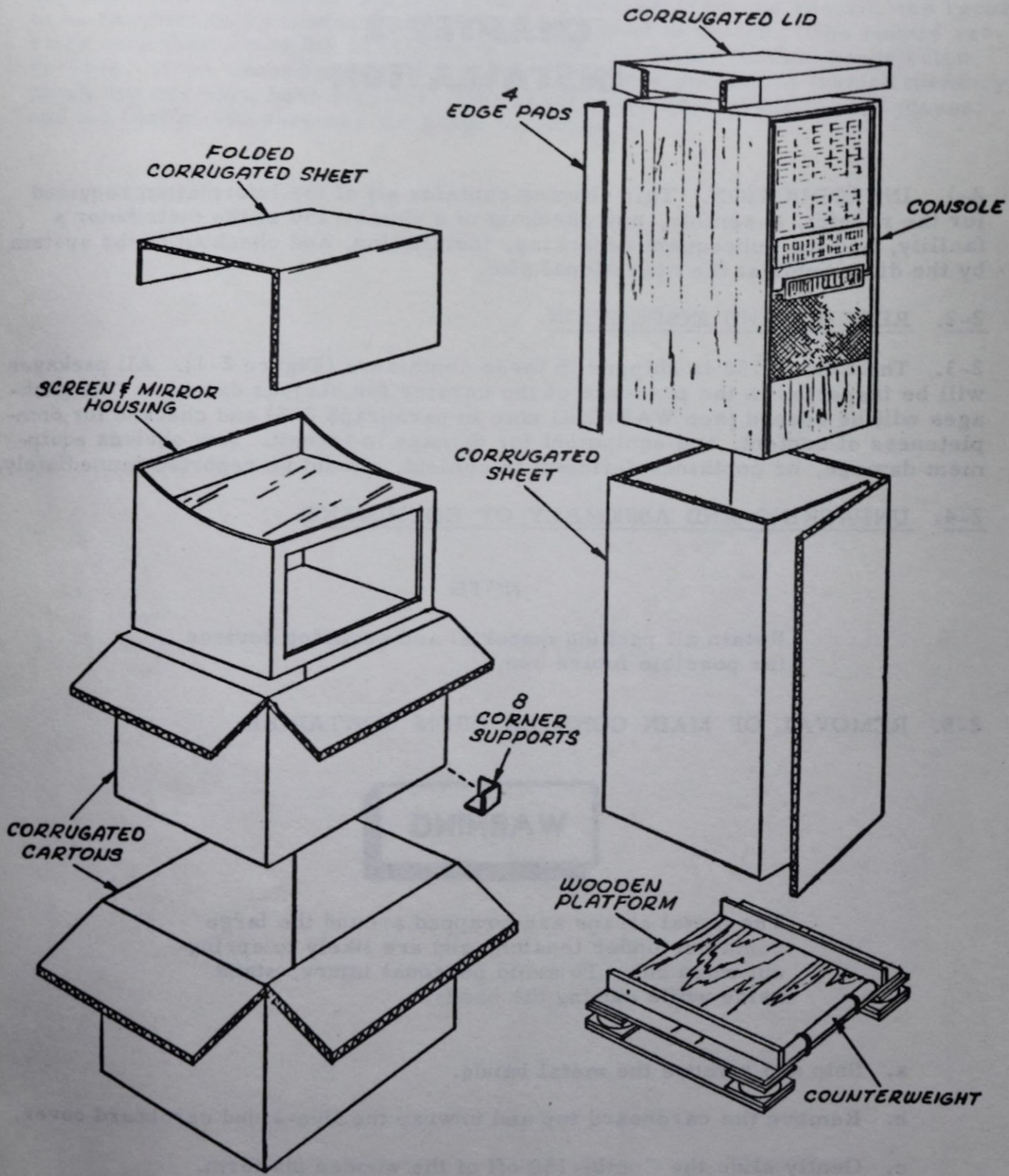


Figure 2-1. Combi-150, Packing Configuration

2-6. REMOVAL OF SECURING DEVICES AND STORED CABINET COMPONENTS.

a. Remove the cabinet keys from the envelope taped to the front door, and open the door.

b. Remove the tape which secures the front door title strips along the bottom.

c. Remove the Allen head screws and flat washers which secure the two cross bars to each side of the console. The cross bars may be left in place, however, without hindering normal system operation.

d. Remove the following devices denoted by red tags:

(1) A wooden block wedged between the right wall and record player platform. The block may be left in place, however, without hindering normal system operation.

(2) The rubber cover over the record player spindle cone, and the sponge wedged between the spindle rocker arm and the left hand support.

(3) A metal strap and key which secure a precut bumper around the record player travel trough.

(4) A thin cardboard strip in the travel trough beneath the record carriage head (turntable).

(5) Two red bolts on the right side of the record player which lock the turntable in place.

(6) The tape which secures the tone arm to the bracket, and the sponge wedged between the tone arm and bracket.

(7) The two plastic caps which protect the tone arm pickup head.

(8) The tape which secures the two cabinet lamps in place.

e. Disengage two pins which lock the record player selection solenoid bar in place, and remove the red tags. Lift the left pin first, then the right.

f. Completely loosen the four wing nuts which secure the record player to its platform. Retaining rings at the tip of the studs prevent the wing nuts from falling off.

g. Remove the technical manual from beneath the record player.

h. Remove the line cord from the convenience outlet at the rear of the unit. Remove the tie wraps and withdraw the line cord from the unit through the access hole at the bottom of the rear wall.

i. Remove the small container and packing material from the top of the film basket.

j. Remove two red clamps from the top of the film basket.

k. The coin box key is stapled to the side of the coin box.

2-7. INSTALLATION OF STORED COMPONENTS.

a. Open the small carton, previously removed from the top of the film basket, and remove one of the two projection lamps.

b. Disengage the two captive screws on top of the projection lamp shield, and remove the shield.

c. Plug the lamp into its socket (see Figure 2-2).

d. Lift the top retainer clip and place the bottom edge of the lamp reflector into the lower retainer. Release the top clip so that it secures the top edge of the reflector.

e. Reconnect the lamp shield.

f. Remove the contents of four envelopes packed in the small carton, and assemble the counterweight as follows:

(1) Attach an S-hook to each end of the counterweight cable, and crimp the hooks.

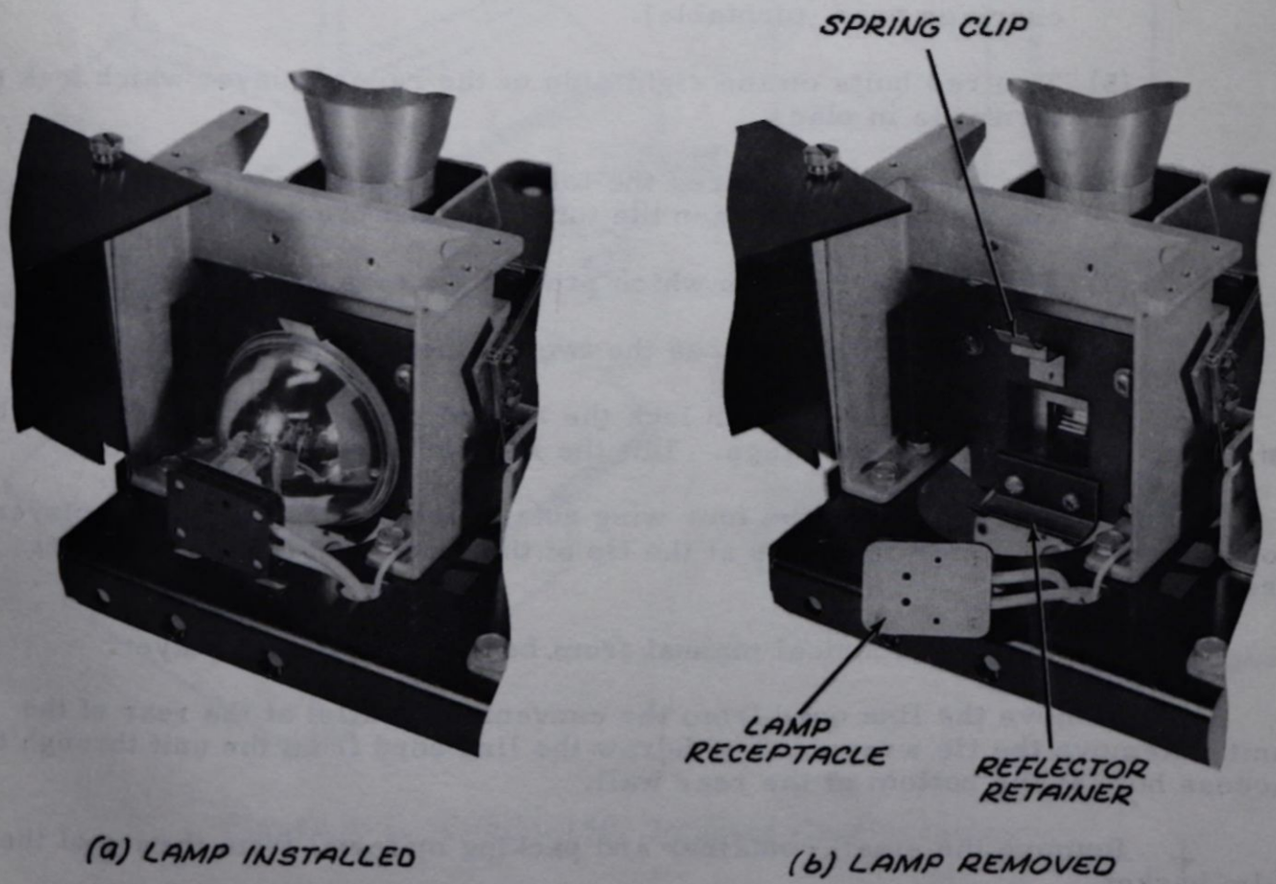


Figure 2-2. Projector Deck, Projection Lamp Installation

(2) Attach a length of string to one end of the cable, and lower the cable into the counterweight tube. Secure the string so that the counterweight can be drawn up through the tube when assembled to the cable.

NOTE

The string used in step (2) should be long enough to allow the counterweight to be assembled outside the cabinet.

(3) Attach one end of the spring to the eye of the counterweight, and the other end to the S-hook.

(4) Thread the rubber damper through the eye of the counterweight, and attach the resultant loops to the S-hook. Crimp the S-hook.

(5) Carefully place the counterweight on its end beneath the counterweight tube. Draw it up through the tube until its eye protrudes from the top of the tube. Insert a screwdriver, or equivalent, through the eye of the counterweight to prevent it from dropping back into the tube.

(6) Manually raise the film basket, and lock it in place by pressing the film select solenoid rocker arm into the film basket select hole. Rotate the main drive gear until the rocker arm stays in place.

(7) Remove the string from the cable, and draw the cable over the two pulleys.

(8) Place the small bracket so that it protrudes up through the slot in the top of the film basket, and attach the S-hook to the bracket. Crimp the S-hook.

(9) Grasp and hold the film basket steady while rotating the main drive gear, until the solenoid rocker arm disengages from the film basket. Slowly lower the film basket.

(10) Push down on the top of the film basket, and remove the screwdriver. Allow the counterweight to drop slowly into the tube.

2-8. UNPACKING AND INSTALLING THE MIRROR AND SCREEN HOUSING.

WARNING

The metal straps are wrapped around the medium-size container under tension, and are likely to spring out when cut. To avoid personal injury, stand aside while cutting the bands.

a. Snip and remove the metal bands.

b. Open the container and remove the inner carton and four corner pads.

c. Open the inner carton and remove the three-sided cardboard top, and the mirror and screen housing.

d. Remove the aluminum shipping bracket which secures the mirror in place, and the paper covering the screen and the mirror.

e. Remove the packing material wedged between the mirror and the rear of the housing.

f. Loosen the wing nuts on each side of the mirror, and position the mirror at a 45-degree angle. Retighten the wing nuts.

g. Remove the last package of hardware from the small carton previously removed from the top of the film basket. Open the package and remove two rectangular plates, and eight each of the following items: carriage bolts, flat washers, lock washers, and wing nuts.

CAUTION

Remove the two cabinet lamps prior to securing the screen and mirror housing to the main console.

h. Carefully place the mirror and screen housing on top of the console.

i. Secure the metal plates to the rear of the main console and housing as shown in Figure 2-3.

j. Insert two carriage bolts down through the bottom front rim of the hood and the top front rim of the housing. Secure with the remaining hardware.

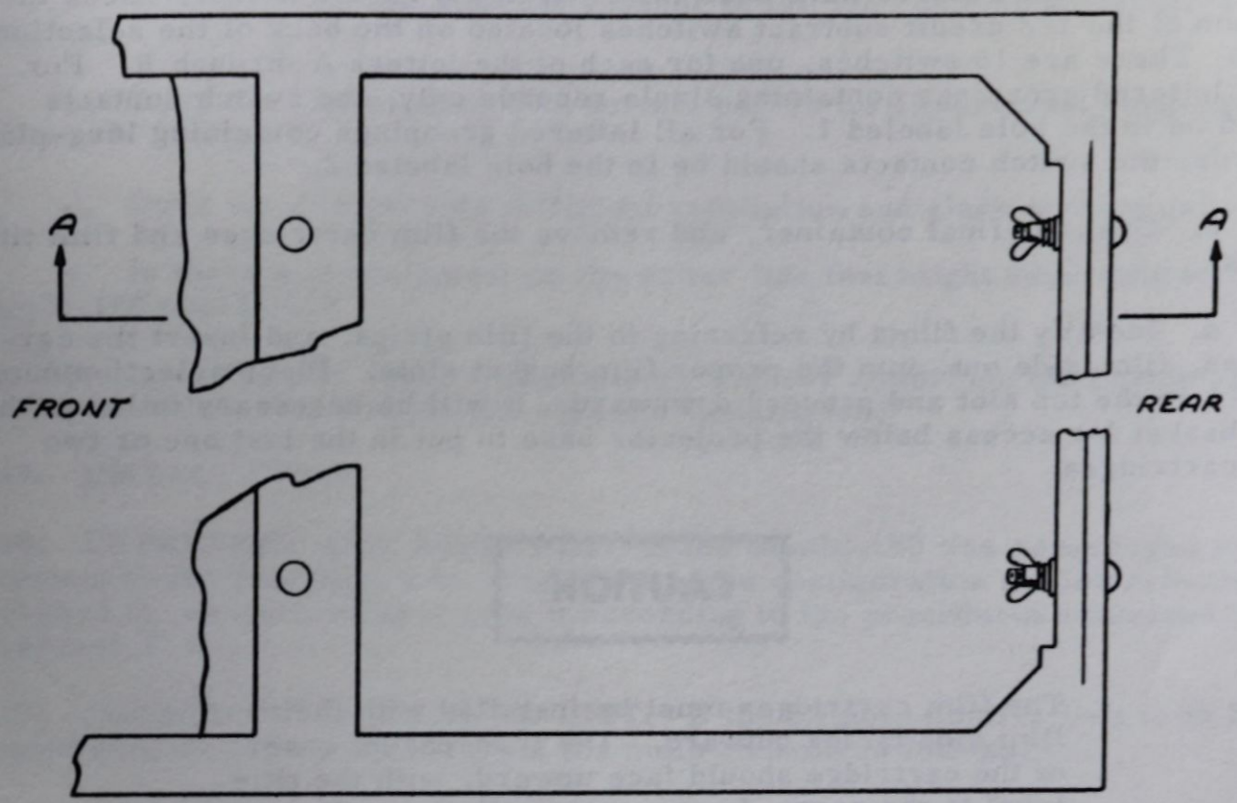
2-9. INSTALLING RECORDS, FILMS, AND TITLE STRIPS.

a. Identify the record position assignment by referring to the title strips, and insert the records into the appropriate record holder slots. Each record is to be put into position with the side having the lower selection number facing left.

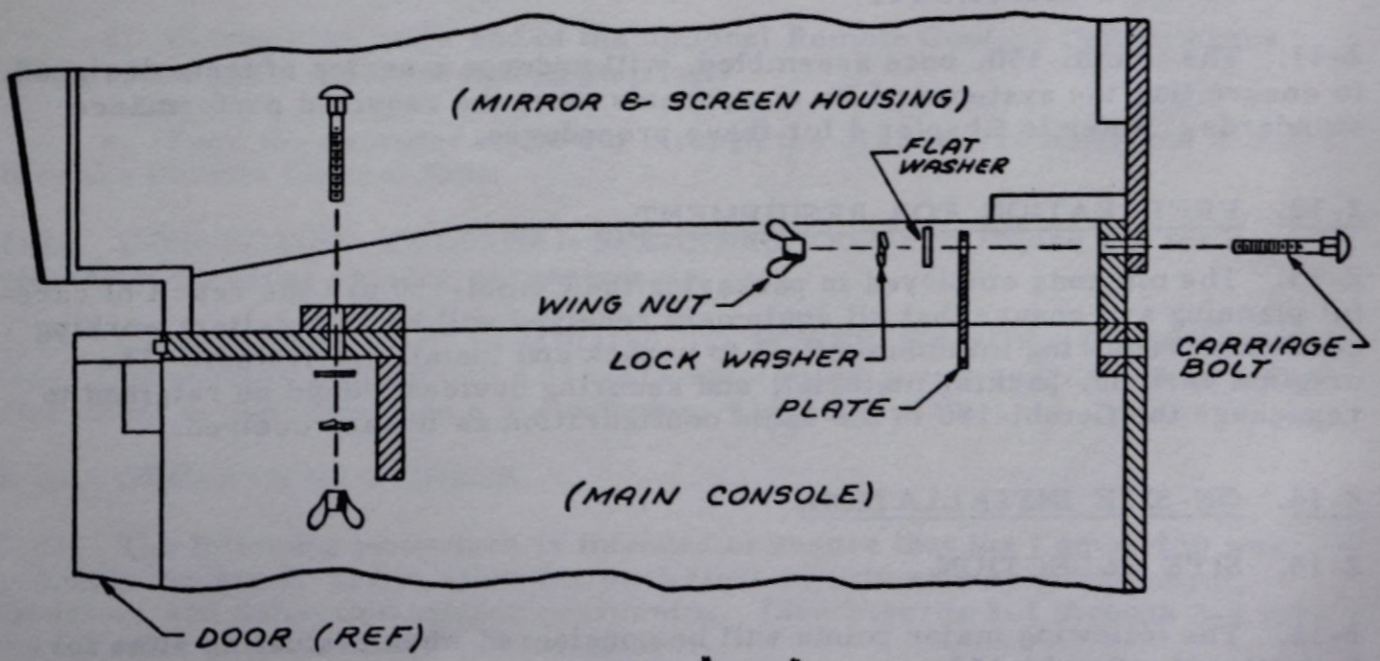
NOTE

A combination of long-play and single records can be loaded in the record holder to make up the 128 selections. However, all four slots of any lettered grouping must contain either four long-play or four single records.

The selection panel keys are lettered A through R, omitting the letters I and O. However, on some units the record holder slots are labeled A through Q, omitting I only. Load the record holder slots O, P, and Q with records bearing the selection panel letters P, Q, and R, respectively.



TOP VIEW



VIEW "A-A"

Figure 2-3. Installation of Mirror and Screen Housing

b. After all records have been installed in the record holder, check the position of the 1-2 credit subtract switches located on the back of the selection panel. There are 16 switches, one for each of the letters A through R. For those lettered groupings containing single records only, the switch contacts should be in the hole labeled 1. For all lettered groupings containing long-play records, the switch contacts should be in the hole labeled 2.

c. Open the final container, and remove the film cartridges and film title strips.

d. Identify the films by referring to the title strips, and insert the cartridges, film-side out, into the proper film basket slots. Place selection number XA in the top slot and proceed downward. It will be necessary to lower the film basket for access below the projector base to put in the last one or two film cartridges.

CAUTION

The film cartridges must be installed with their film side facing outward. The transparent cover of the cartridge should face upward, with the title label to the rear. Improper installation will result in damage when a film is selected for play.

e. Disengage and raise the title boards. Insert the title strips into the appropriate slots, and resecure the title boards.

2-10. SYSTEM CHECKOUT.

2-11. The Combi-150, once assembled, will undergo a series of tests designed to ensure that the system and its components meet the required performance standards. Refer to Chapter 4 for these procedures.

2-12. PREPARATION FOR RESHIPMENT.

2-13. The methods employed in packaging the Combi-150 are the result of careful planning and ensure that all equipment received will be in excellent working condition, requiring minimum effort to unpack and install the system. The original cartons, packing material, and securing devices should be retained to repackage the Combi-150 in the same configuration as it was received.

2-14. ON-SITE INSTALLATION.

2-15. SITE SELECTION.

2-16. The following major points will be considered when evaluating sites for installing the Combi-150:

a. Does the site provide an unobstructed view for the majority of the film-playing audience, while at the same time provide the proper acoustics for the record-playing audience?

b. Will utilizing the external speaker provision clear up any audio-video conflict?

c. Does the site conflict with normal patron traffic or usual congregating patterns?

d. Does the site provide sufficient ventilation and glare protection?

e. Is there any equipment on the power line that might adversely affect Combi-150 operation?

f. Does the site require alterations, thereby disturbing the customer's facility and hindering a rapid and efficient installation?

2-17. INSTALLATION.

2-18. UNPACKING AND ASSEMBLY. If the Combi-150 was repackaged for shipment to the customer's facility in the same configuration as Color-Sonics packaged it, unpack and assemble it according to the procedures contained in paragraph 2-4.

2-19. LOCATING THE REMOTE UNIT. If the Remote Control Unit is to be located externally, remove it from the main console as follows:

a. Disconnect the cable from the Remote Control Unit.

b. Remove the two nuts and four washers which secure the Remote Control Unit and retaining bracket to the rear wall.

c. Remove the Remote Control Unit and mount the cover plate (optional accessory) and retaining bracket.

d. Connect the male end of the optional Remote Control Unit extender cable to the cable disconnected in step (a).

e. Feed the extender cable out through the oval access hole, and connect it to the Remote Control Unit.

2-20. CONNECTING EXTERNAL SPEAKERS. Refer to Figure 2-4 for a variety of external speaker arrangements.

2-21. CONNECTING THE COMBI-150 TO POWER SOURCE. Connect the 15-foot, 3-conductor line cord to a 115-117 vac, 60 Hz power source. If an extension cable is required, use a 3-conductor, #14 AWG cable.

2-22. OPERATIONAL CHECK.

2-23. The following procedure is intended to ensure that the Combi-150 was properly installed, and to allow for such final adjustments as audio output, focusing, and deflection mirror positioning. (See Figures 3-1 through 3-4 for the location of all controls and indicators.)

a. Set the Records Only switch to FILM & RECORDS and the Power switch to ON. Observe that:

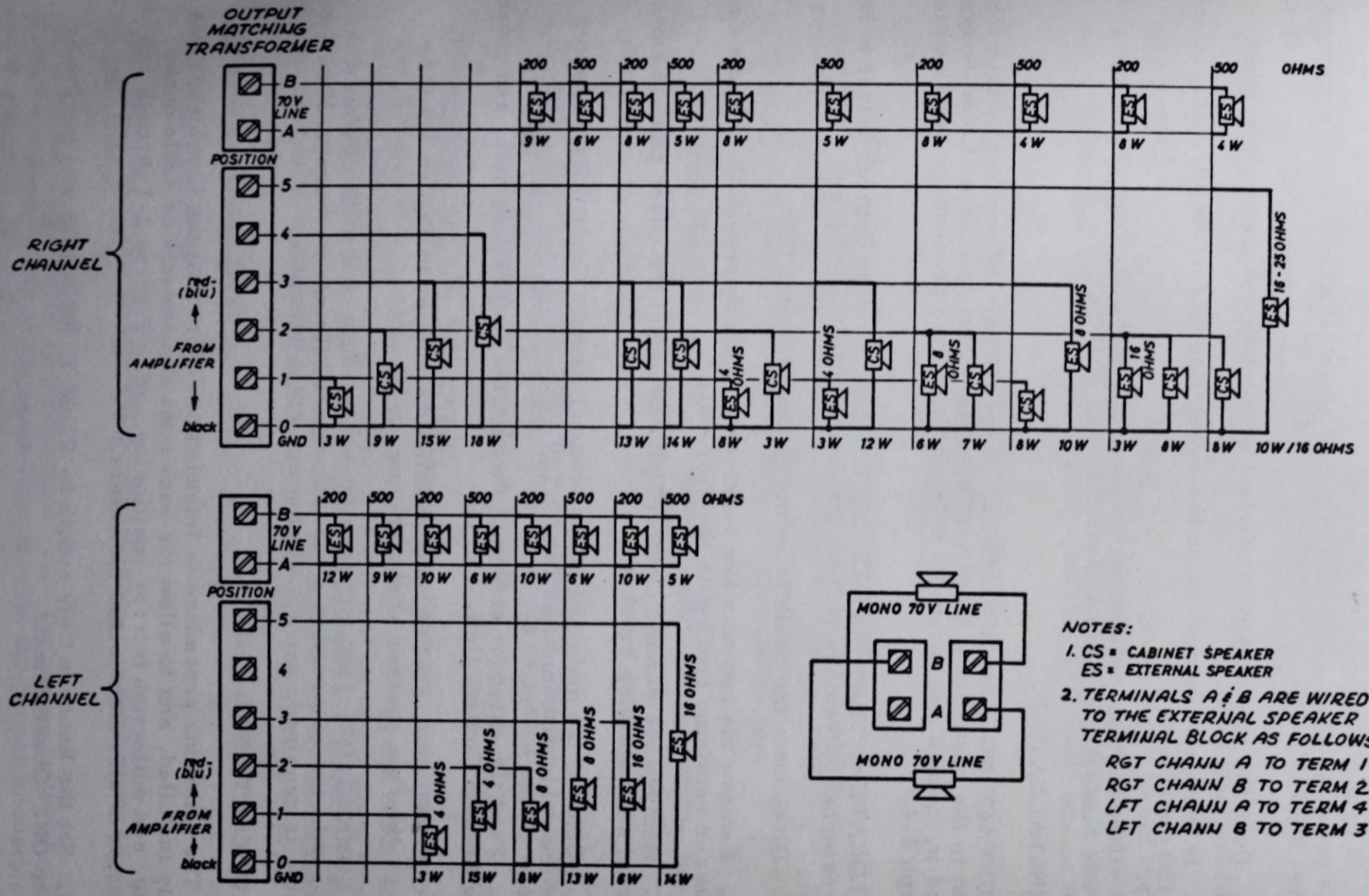

OUTPUT MATCHING TRANSFORMER
RIGHT CHANNEL
LEFT CHANNEL
70V LINE
POSITION
FROM AMPLIFIER
blk-(blu)
block
GND
200 500 200 500 200 500 200 500 200 500 OHMS
9W 6W 8W 5W 8W 5W 8W 4W 8W 4W
3W 9W 15W 18W 13W 14W 8W 3W 3W 12W 6W 7W 8W 10W 3W 8W 8W 10W/16 OHMS
4 OHMS
8 OHMS
16 OHMS
16-25 OHMS
12W 9W 10W 6W 10W 6W 10W 5W
3W 15W 8W 13W 6W 14W
MONO 70V LINE
B
A
NOTES:
1. CS = CABINET SPEAKER
ES = EXTERNAL SPEAKER
2. TERMINALS A & B ARE WIRED TO THE EXTERNAL SPEAKER TERMINAL BLOCK AS FOLLOWS:
RGT CHANN A TO TERM 1
RGT CHANN B TO TERM 2
LFT CHANN A TO TERM 4
LFT CHANN B TO TERM 3

Figure 2-4. Optional Speaker Arrangements

(1) The two cabinet lamps illuminate.

(2) Each Audio Amplifier SAFETY-LAMP illuminates.

(3) The coin lockout solenoid energizes.

b. Insert a quarter into the coin slot. Observe that the front-panel Two Credit lamp illuminates.

c. Select a single record for play. Observe that the Two Credit lamp goes out, the One Credit lamp lights, the tone arm starts at the lead-in groove, and the selected record is played.

d. Select another single record and observe that the One Credit lamp goes out.

e. While the record is playing, verify operation of the Remote Control Unit as follows:

(1) Rotate the VOLUME control from 1 to 10; the volume increases with clockwise rotation.

(2) Set the BALANCE control to maximum ccw position, and slowly rotate to maximum cw position. With the control in maximum ccw position, maximum audio output emanates from the left channel and the right channel is muted. Clockwise rotation slowly balances the channel outputs, ultimately muting the left channel and shifting the maximum audio output to the right channel.

(3) Set the BASS switch first to MIN., then MED., and finally to MAX. Increasing emphasis is placed on the low frequency portion of the audio output.

(4) Repeat the procedure using the TREBLE switch. Increasing emphasis is placed on the high frequency notes.

(5) Adjust the Remote Control Unit for the desired audio effect.

f. Allow the record to complete play, and observe that it is properly rejected and returned to its holder.

g. While the record is playing, depress the RECORD-REJECT button on the Remote Control Unit and hold for approximately two seconds. Observe that the record is properly rejected and that the record carriage head scans the record memory bar before coming to rest.

h. Insert a quarter into the coin slot.

i. Select a film for play. Observe the following:

(1) The Two Credit lamp goes out.

(2) The film basket rises to its uppermost position, stops, and scans downward until the selected film lies opposite the projector deck.

(3) The film basket locks and the selected film is drawn onto the projector deck.

(4) The cabinet lamps dim.

(5) The projection lamp illuminates.

(6) The ventilating fan operates.

j. While the film is playing, make the following adjustments:

(1) Place a black cloth or piece of cardboard over the screen. This allows films to be viewed within the cabinet either on the back of the screen or on the mirror.

(2) Loosen the wing nut on each side of the large mirror.

(3) Position the mirror so that the image is centered top and bottom on the screen. Retighten the wing nuts.

(4) Slowly turn the lens and adjust for fine focus. For best results, focus while the film is on a long shot.

(5) Adjust the Brightness control for the desired effect.

NOTE

Ensure that the lens setscrew does not rest on the high point of the threaded lens barrel. Normal film basket vibration will loosen the setscrew and destroy film focus.

k. Depress and hold the white cam on the right-front of the projector deck. Within approximately eight seconds:

(1) Film play stops.

(2) The projection lamp extinguishes.

(3) The ventilating fan stops.

l. Release the cam and observe that normal film play resumes.

m. Depress the RECORD-REJECT button on the Remote Control Unit. Make the same observations as in step k, noting also that the film cartridge is properly rejected and the cabinet lamps assume full brilliance.

n. After the Combi-150 assumes the stand-by mode, reselect the film used in step i and allow it to complete its normal play cycle. If this is not done, the film will pick up play at the point of rejection when it is next selected by a customer, giving partial film play for a quarter.

o. When the Combi-150 again assumes the stand-by mode, set the Power switch to OFF.

CHAPTER 3
OPERATION

3-1. INTRODUCTION. This section contains all of the information required to properly operate the Combi-150. The operator is familiarized with the location and function of all controls and indicators used in the equipment, and provided with the proper operating procedures.

3-2. CONTROLS AND INDICATORS.

3-3. Table 3-1 lists all of the controls and indicators employed in the Combi-150, detailing the location, nomenclature, and function of each.

Table 3-1. Combi-150, Controls and Indicators

LOCATION	CONTROL/INDICATOR	FUNCTION
Front door (Figure 3-1)	WHEN LIT SELECT SINGLES ONLY lamp (One Credit lamp)	Indicates sufficient credit to select a single-play record.
	SELECT 2 SINGLES OR 1 FILM OR ALBUM lamp (Two Credit lamp)	Indicates sufficient credit to select a film, one long-play selection, or two single selections.
	SELECT RECORDS ONLY lamp	When lit, indicates the system is operating in the jukebox mode only.
	Selection Panel keys	Program desired record or film when depressed.
	Coin Reject button	Returns trapped or rejected coins when depressed.
	Service Credit switch	Activates the Credit Unit in lieu of quarters.
Rear of cabinet (Figure 3-2)	REJECT button	Interrupts record or film play and initiates return of record or film to proper holder.
	Records Only switch	Provides for continuous jukebox operation if film play is not desired.

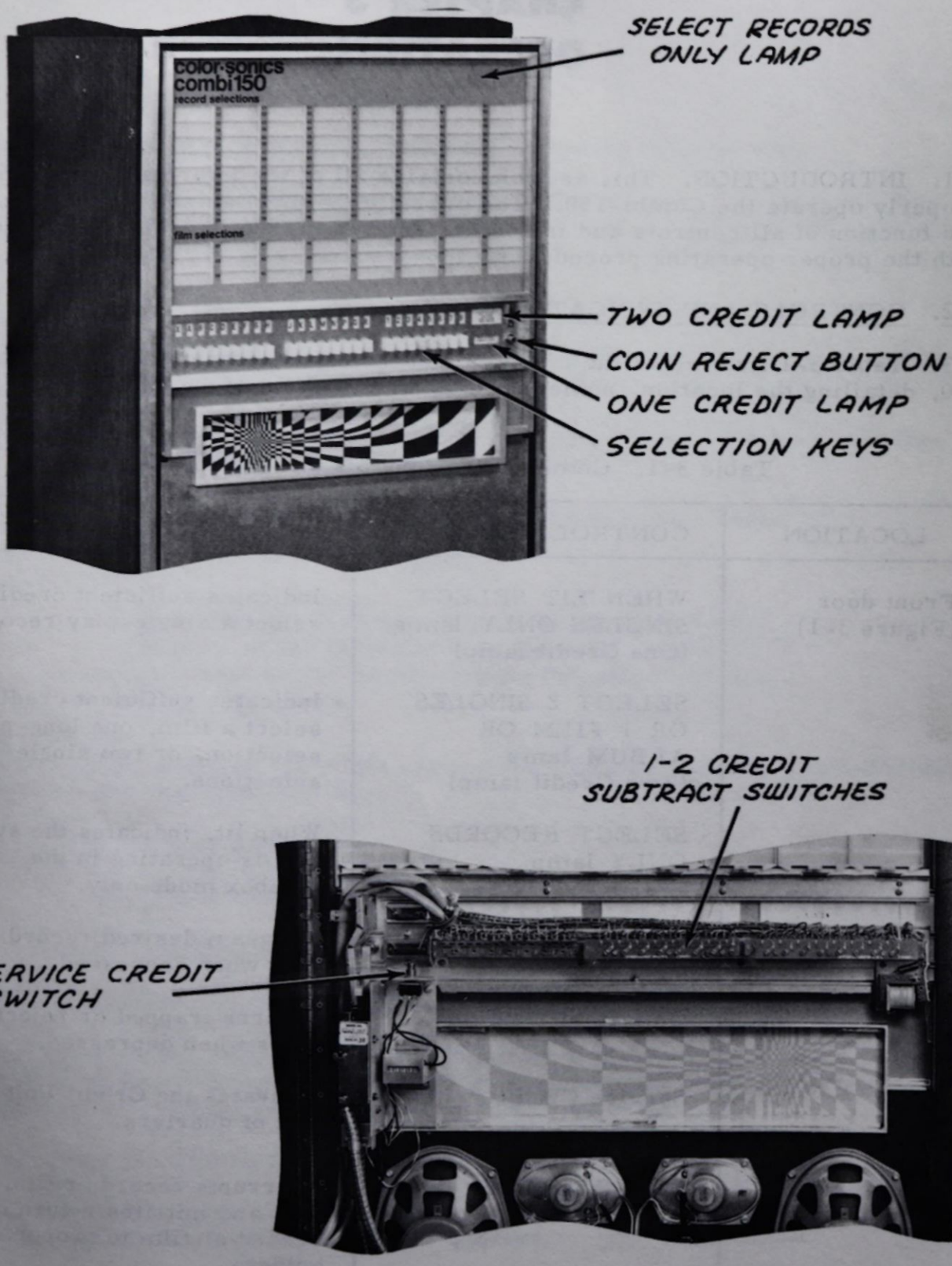


Figure 3-1. Door Assembly

Table 3-1. Combi-150, Controls and Indicators (Cont)

LOCATION	CONTROL/INDICATOR	FUNCTION
	Power ON/OFF switch	Applies/disconnects system power.
Projector base (Figure 3-3)	Film Service Reject switch	Interrupts film play and initiates return of film cartridge to the film basket.
	Brightness control	Controls brightness of displayed film.
Audio Amplifier (Figure 3-4)	SAFETY-LAMP	Overvoltage protection circuit indicator; normally lit.
	RECORD-QUALITY-COMPENSATOR switch	Regulates bass and treble portions of the amplifier output to compensate for spurious record noise.
Remote Control Unit (Figure 3-4)	VOLUME control	Regulates audio level.
	BALANCE control	Used either to balance the audio level of both channels or to mute either channel.
	BASS switch	Regulates low frequency portion of audio output.
	TREBLE switch	Regulates high frequency portion of audio output.
	RECORD-REJECT button	Interrupts record or film play and initiates return of record or film to the proper holder.

3-4. OPERATING INSTRUCTIONS.

3-5. OPERATING MODES.

3-6. The Combi-150 can operate in either of two modes: film and records, or records only. This allows for continuous utilization of the jukebox capability during such periods as film system servicing or periodic maintenance. Mode selection is accomplished by setting the RECORDS ONLY switch to either FILM & RECORDS (for the normal film and record mode) or RECORDS ONLY (for the jukebox mode) prior to energizing the system.

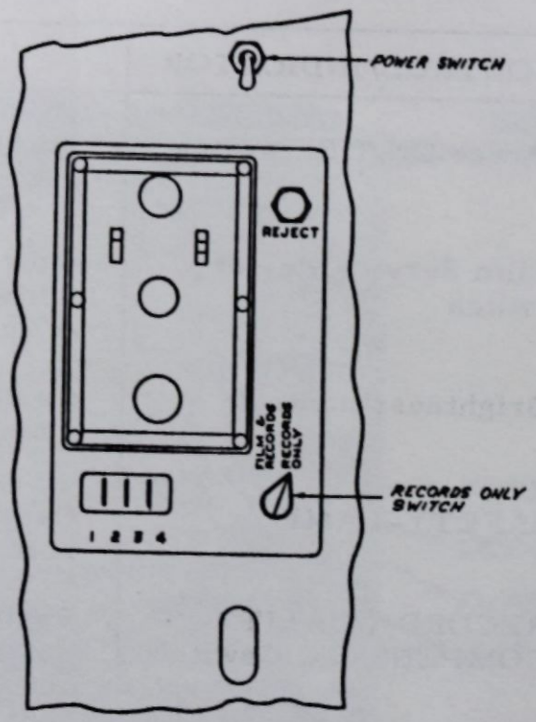


Figure 3-2. Rear of Cabinet, Combi-150

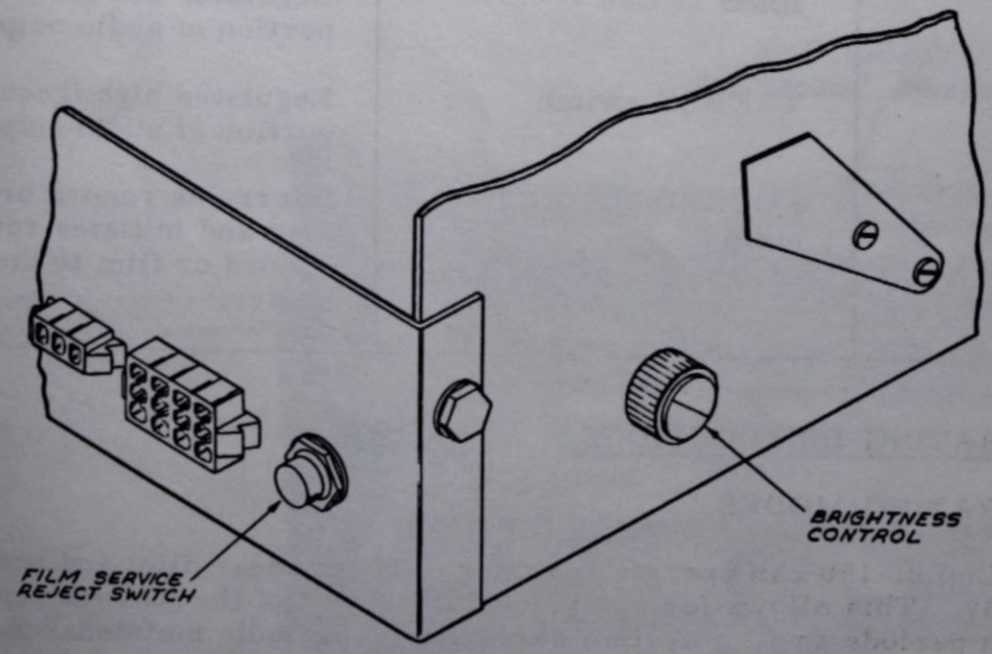


Figure 3-3. Projector Base, Part of Combi-150 Transport Mechanism

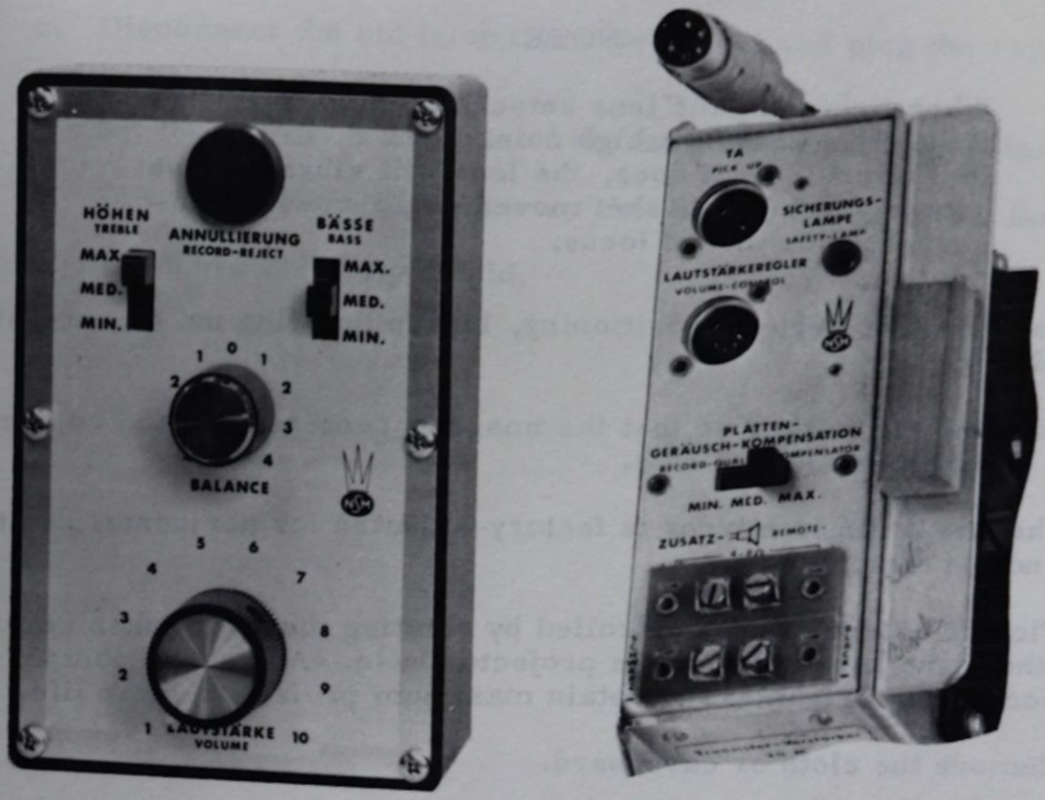


Figure 3-4. Audio Amplifier and Remote Control Unit

3-7. ENERGIZING AND DE-ENERGIZING THE EQUIPMENT.

3-8. After the Combi-150 has been connected to the proper power source, set the RECORDS ONLY switch to the desired mode of operation. Energize the system by setting the Power switch to ON. To de-energize the Combi-150, set the Power switch to OFF.

3-9. SELECTING FILMS AND RECORDS.

a. Deposit a quarter in the coin slot. If the front-panel selection lamp does not light, depress the Coin Reject button and insert another quarter.

b. Scan the title chart and select one of the following: one film, one long-play selection, or two single selections.

c. Depress those Selection Panel keys corresponding to the title strip selection number of the chosen film or record.

d. If the two, single-selection option was chosen, wait until the One Credit lamp lights before programming the second selection.

3-10. FOCUSING FILM.

a. Place a black cloth or piece of cardboard over the screen. This allows one to view films from within the cabinet either on the large mirror or on the back of the screen.

b. Slowly rotate the lens for fine focus. For best results, focus while the film is on a long shot. Retighten the setscrew.

NOTE

When tightening the lens setscrew, make sure that it does not rest on a high point of the threaded lens barrel. If it does, the lens will vibrate loose with normal film basket movement, throwing subsequent films out of focus.

c. To adjust for vertical positioning, loosen the wing nut on each side of the large mirror.

d. Position the mirror so that the image is centered top and bottom on the screen. Retighten the wing nuts.

e. The small finger mirror is factory-adjusted for horizontal positioning and should not be disturbed.

f. Picture brightness is controlled by rotating the Brightness control, located on the right-hand panel of the projector base. Adjust the control for minimum acceptable brightness to obtain maximum projection lamp life.

g. Remove the cloth or cardboard.

3-11. ADJUSTING AUDIO OUTPUT.

3-12. The Remote Control Unit and two Audio Amplifiers have provisions for regulating the sound level, tone quality, and audio output distribution. The location and function of the applicable controls are contained in Table 3-1. Experiment with various switch and control settings to achieve the desired effect.

3-13. REJECTING FILMS AND RECORDS.

3-14. Records and films are rejected by depressing either the cabinet-mounted REJECT button or the Remote Control Unit RECORD-REJECT button. In addition, records can be rejected by gently lifting the tone arm from the record surface and slowly advancing it forward until a slight clicking sound is heard. When the click is detected, release the tone arm. Films can also be rejected by depressing the Film Service Reject switch, located on the projector base.

3-15. If possible, refrain from repeatedly rejecting films, as this causes the film select solenoid to overheat and react slowly to commands. The condition manifests itself in the system's inability to select the proper film. Allow the solenoid approximately 60 seconds to cool off.

3-16. REPLACING THE PROJECTION LAMP.

3-17. To replace the projection lamp, proceed as follows (see Figure 2-2):

a. Completely disengage one of the two captive screws on top of the projection lamp shield, loosen the second screw, and swing the shield outward.

b. Raise the clip which secures the lamp along its top edge, and lift the lamp off of the bottom retainer.

c. Disconnect the old lamp from its socket and plug the replacement lamp in.

d. Set the bottom front edge of the lamp into the lower retainer.

e. Lift the clip and place it over the top front edge of the lamp.

f. Resecure the lamp shield.

b. Raise the clip which secures the lamp along its top edge, and lift the lamp off of the bottom retainer.

c. Disconnect the old lamp from its socket and plug the replacement lamp in.

d. Set the bottom front edge of the lamp into the lower retainer.

e. Lift the clip and place it over the top front edge of the lamp.

f. Reassure the lamp shield.

CHAPTER 4
MAINTENANCE

4-1. ROUTINE SERVICING.

4-2. GENERAL. The material contained in the following paragraphs is intended solely to provide a base upon which an effective periodic preventive maintenance program can be built. The experience of the distributor in servicing equipment of a similar nature and a thorough analysis of individual equipment service records will be employed, along with the following procedures, to formulate the ultimate maintenance program and the frequency of performing the various tasks contained therein. A comprehensive and properly applied maintenance program will increase the system's mean-time-between-failure rate. The resultant reduction in equipment down time leads to longer periods of income-producing operation.

4-3. EQUIPMENT SERVICE RECORDS.

4-4. It is imperative that service records be established for each Combi-150 in operation. The records will be updated continuously and monitored closely. The maintenance history developed from each service record will complement the general maintenance program by indicating specific tasks required to ensure the operational readiness of individual equipments.

4-5. DETECTING WORN OR DEFECTIVE PARTS.

4-6. The following areas will be checked periodically, and any worn or defective parts replaced before they contribute to system malfunctions.

a. Record Player.

(1) Check the condition of the styli, using both sides of a good-quality record. If replacement is indicated, remove the complete dual cartridge. This is accomplished by removing a single nut and bolt, and unplugging the cartridge.

(2) Check the selection motor and turntable drive belts for any signs of wear.

(3) Check the cables that connect to the record carriage head for positioning and wear. Ensure that the rectangular rubber-covered cable does not bind and is not twisted.

b. Selection Panel.

(1) Check the 25 selection panel switches for bent or broken contacts, broken wiring, or the presence of conductive waste material. With nearly all of the 220 contacts wired, a switch may be easily shorted.

c. Coin Unit.

(1) The coin accept chute is blocked during system shutdown by a pin protruding from a plate in front of the coin lockout solenoid. When the system is energized, the plate is attracted by the solenoid, opening the coin accept path. The plate should be checked under shutdown conditions to ensure that it has not been bent from prolonged periods of being drawn to the solenoid.

d. Film Cartridges.

(1) Film cartridges will be checked for the presence of bubbles on the surface facing the projection lamp. Pronounced bubbles, if not filed down, will prevent the cartridge from seating properly on the projector deck, resulting in out-of-focus images.

e. Projector.

(1) The flywheel drive belt, located beneath the projector, is subject to constant twisting and flexing during the film play mode. It should be checked periodically for stretching or other signs of wear. If replacement is indicated, wind the new drive belt as shown in Figure 4-1.

(2) Check the shutter drive belt for signs of wear. It is not subject to the same stresses as the flywheel drive belt and should not require frequent replacement. It should be checked periodically and wiped dry of any lubricant.

CAUTION

Use nonmagnetic tools when performing the following procedure so the sound head will not magnetize. Exercise extreme care when bending the pressure shoe.

(3) The pressure shoe and pinch roller swing up and down on a pivot, making and breaking contact with the sound head and capstan, respectively. Remove a cartridge from the film basket and select that film for play. After the projector begins to operate, ensure that the pressure shoe properly contacts the sound head. If not, adjust the shoe to accomplish contact.

f. Delivery System.

(1) Check the delivery system drive belts for any signs of wear.

(2) Note the condition of the gear system. Check that all mounting hardware is secure, that respective gears mate properly, and that no gear has any broken, chipped, or worn teeth.

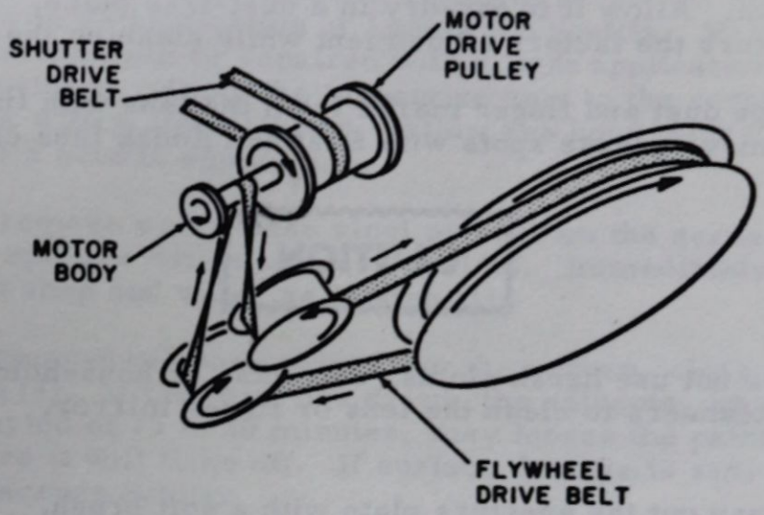


Figure 4-1. Belt Winding Diagram

4-7. CLEANING AND LUBRICATION.

a. Record Player.

(1) Keep the travel trough free of dirt or other particles that would prevent the turntable from completely scanning the record memory bar and activating either of the reversing switches.

(2) Check the position contact board for dirty contacts.

(3) Check the selection motor finger contacts for bent, broken, or dirty contacts.

b. Film Memory.

(1) The contacts on the film memory board should be cleaned periodically to prevent unnecessary noise resulting from film basket travel, and to ensure proper electrical contact with the film basket sliding contacts. Use cramolin liquid or any insulating liquid spray (silicon aerosol spray, etc.).

c. Film Basket.

(1) Ensure that the set of finger contacts at the top of the basket are clean, straight, not worn, and are aligned with the film memory board contacts.

d. Projector.

(1) Clean the sound head, capstan, and pinch roller with a standard, good-quality sound head cleaner.

(2) Wash the small finger mirror with Eastman Kodak lens cleaning fluid, or a mild solution of soap and water, applied with a soft cloth. Allow it to air-dry in a dust-free place. Be careful not to disturb the factory adjustment while cleaning the mirror.

(3) Wipe dust and finger marks from the lens with fine lens tissue. Remove grease spots with Eastman Kodak lens cleaning fluid.

CAUTION

Do not use harsh cloths, solvents, or household cleansers to clean the lens or finger mirror.

(4) Clean out the aperture plate with a soft brush.

e. Deflection Mirror and Screen.

CAUTION

Exercise extreme care while working on or around the deflection mirror. It is a front surface mirror and the metallized surface can be scratched easily.

(1) Wash the deflection mirror with Eastman Kodak lens cleaning fluid, or a mild solution of soap and water, applied with a soft cloth. Allow it to air-dry in a dust-free place.

(2) Remove dust from the screen with a soft, clean cloth. Remove soil marks by dampening a cloth or cellulose sponge with soapy water, wringing the excess moisture out. Rinse the surface with clear water and blot dry.

(3) Remove pencil marks, chalk marks, dust, soot, etc. from the screen with an artgum or Ruby pencil eraser. Use an eraser containing a fine abrasive (typewriter or ball pen eraser) for stubborn marks. For marks covering a large area, use a mild solution of soap and water applied with a soft, clean cloth. Rinse and blot dry. Rub marks left by erasers can be covered by applying Lenscreen Scuffix repair compound.

(4) Remove wax pencil or oil-base marks from the screen by applying a sparing amount of Ronsonol lighter fluid, white gasoline, or refined naptha. Use a soft, clean cloth, taking care not to spread the contamination to a larger area.

(5) Remove scuffs and scratches from the screen by first removing any soil marks as in steps (3) and (4). If slight scuffs are still

evident, they may be covered with a light application of refined mineral oil. Minor scuffs and light scratches might be covered up with an application of Lenscreen Scuffix. Harsh scuffs and scratches can be repaired with a light application of pure gum turpentine. Apply the turpentine only to the scratch edge or scuff area with a clean blotter. Allow one hour to dry and follow up with a Scuffix application.

(6) To remove water-base vinyl paint from the screen, first remove the spillage with a clean, dry cloth. Immediately wash the area with soap and water as in step (3).

(7) To remove oil-base paint from the screen, clean at once as in step (4). If the paint has dried, the solvents, when applied over a period of 15 to 30 minutes, may loosen the paint to the point where it will flake off. If surface damage is still visible, apply Lenscreen Scuffix.

f. Coin Unit.

(1) Clean the mainplate with any household cleanser. Remove resultant deposits or film by thoroughly rinsing and drying the plate.

(2) Swing the magnet assembly out and remove any metal filings by running a screwdriver, awl, ice pick, or the like, along the edges of the magnet.

(3) Swing the transfer mechanism out and clean its surface, holes, and bushings with a pipe cleaner, cotton swab, or equivalent.

(4) Lubricate the pivot pins and hinges with sparing amounts of powdered graphite or pencil lead. Wipe off the excess graphite with a lint-free cloth.

(5) The flexible coin return chute is removed easily and cleaned by running a wire snake through it.

g. Cabinet.

(1) A dust-free atmosphere within the cabinet is essential for optimum system performance. The two air filters at the bottom rear of the cabinet and the back of the mirror and screen housing should be checked and vacuumed or replaced regularly.

4-8. SYSTEM CHECKOUT AND TROUBLE ANALYSIS.

4-9. SYSTEM CHECKOUT.

4-10. The following procedures are intended to establish the operational readiness and reliability of all functional elements of the Combi-150. Complete performance of all steps, without encountering abnormal indications, indicates that the system meets the required performance standards. If an abnormal indication is observed, stop testing and refer to Table 4-1 (see paragraph 4-17) for an analysis of the malfunction. When the malfunction has been corrected, repeat the test that failed and continue with the remaining tests.

4-11. PRELIMINARY ADJUSTMENTS.

a. Connect the system to proper power source.

b. Set the Records Only switch to FILM & RECORDS and the Power switch to ON.

c. Place a black cloth or piece of cardboard over the screen. This allows films to be viewed either on the back of the screen or on the mirror while working inside the cabinet.

d. Depress the Service Credit switch once and select a film for play. While the film is playing, loosen the wing nut on each side of the large mirror.

e. Position the mirror so that the image is centered top and bottom on the screen. Retighten the wing nuts.

f. Slowly adjust the lens for fine focus. For best results, focus while the film is on a long shot.

g. Adjust the projector base mounted Brightness control to lighten or darken the film.

h. After the film completes play, remove the cartridge from the film basket.

i. Depress the Service Credit switch once and reselect the film.

j. While the projector is operating, place one hand on the speakers and adjust the hum-bucking coil (mounted on the projector deck) for minimum speaker vibration.

k. Depress the Film Service Reject switch and return the film cartridge to the film basket.

l. Set the Power switch to OFF.

m. Remove the cloth or cardboard and allow the film to complete play.

n. To ensure proper feed-back isolation, check that the four wing nuts securing the record player to its platform are completely loosened.

4-12. INPUT POWER CHECK.

a. With the Combi-150 connected to the proper power source and the Records Only switch set to FILM & RECORDS, energize the unit by setting the Power switch to ON. Observe the following:

(1) The cabinet lights illuminate.

(2) Each Audio Amplifier SAFETY-LAMP illuminates.

(3) The coin gate solenoid energizes.

b. Set Power switch to OFF.

4-13. COIN UNIT CHECK.

a. With the Combi-150 de-energized, insert a quarter into the coin slot. The coin passes through the coin mechanism and chute, into the coin return slot.

b. Set Power switch to ON.

c. Depress and hold the Coin Reject button.

d. Insert a quarter into the coin slot. The coin passes through the coin mechanism and chute, into the coin return slot.

e. Release the Coin Reject button and insert another quarter. Observe the following:

(1) The front-door coin counter advances one step.

(2) The quarter passes into the coin box.

4-14. CREDIT CHECK.

a. If the Two Credit lamp is lit, depress the Service Credit switch three times. If not, depress the Service Credit switch four times.

NOTE

If the Combi-150 under test contains single records only, disregard steps b. through d. If it contains albums only, disregard steps d. through f. Otherwise, perform all steps of this test.

b. Select three films and one album in any order. Observe that the Two Credit lamp extinguishes after the fourth selection.

c. Clear the record and film memories.

NOTE

To clear the record memory, depress any raised record memory selection pins. To clear the film memory, insert one end of a test lead into pin 3 of the film memory plug that mates with J3 on the power supply. Remove the Selection Panel cover and run the other end of the lead along the outside row of selection panel key contacts, thereby discharging the film memory capacitors. If time allows, the film memory can be cleared by permitting the films to complete play.

d. Depress the Service Credit switch four times.

e. Select three films and two single selections in any order.

(1) If a film was selected last, the Two Credit lamp extinguishes after the last selection.

(2) If a record was selected last, the Two Credit lamp extinguishes after the fourth selection and the One Credit lamp lights; it extinguishes after the last selection.

f. Clear the record and film memories.

4-15. SEARCH-PLAY-REJECT CHECK.

a. Record the position of the 1-2 credit subtract switches, then set them to position 1.

b. Depress the Service Credit switch seven times in slow succession.

c. Select film XA and four records. Observe that the film basket elevates to its uppermost position and begins a downward searching movement. As it begins to move downward, perform step d.

d. Select films XB, XC, and XD. Observe that the film basket reverses direction smoothly, elevating itself to its uppermost position, then searching downward until film XD lies opposite the projector deck.

e. As film XD is drawn onto the projector deck, note the following:

(1) The two cabinet lights dim.

(2) The projection lamp lights.

(3) The ventilating fan operates.

f. While the film is playing, note the following:

(1) The picture is in focus and properly positioned on the screen, with no flutter or other irregularities evident.

(2) The audio output is good, with no appreciable hum.

g. While the film is playing, depress and hold the white cam on the projector deck. Note that within approximately eight seconds the following occurs:

(1) The film play is interrupted.

(2) The projection lamp extinguishes.

(3) The ventilating fan stops.

h. Release the cam and allow the film to complete its normal play cycle; then observe the following:

(1) The projection lamp extinguishes.

(2) The ventilating fan stops.

(3) Both cabinet lamps assume full brilliance.

(4) The film cartridge is withdrawn from the projector deck and inserted into the film basket.

(5) The film basket elevates to its uppermost position and searches downward until film XC lies opposite the projector deck.

NOTE

Even though records were preselected (step c) before film XD (step d), the record carriage will not search as long as the film memory contains a preselected film.

i. After approximately 1-1/2 minutes, depress the Film Service Reject switch located on the projector base. Observe the same results as in step h, except that the film basket stops searching when film XB lies opposite the projector deck.

NOTE

When rejecting films in succession, allow at least 1-1/2 minutes between rejections. If this is not done, the film select solenoid will overheat and take longer to respond to commands. This will result in the solenoid rocker arm engaging the wrong film basket select hole, thereby projecting a film other than the one selected.

j. Reject film XB by depressing the REJECT button located at the outside back of the cabinet. Again observe the same results as in step h, except that the searching stops when XA lies opposite the projector deck.

k. Reject film XA by depressing the RECORD-REJECT button on the Remote Control Unit. Observe the following:

(1) The film is properly rejected and the film basket elevates and searches for further preselected films.

(2) With the film memory empty, the record carriage head searches laterally over the record memory bar until it contacts a raised record memory pin.

(3) The carriage locks in position, the selected record is extracted and placed on the turntable, and play begins.

NOTE

When the record carriage reaches either the extreme left- or right-hand edge of the record memory bar during the search cycle, the carriage motor slows down and reverses itself within approximately 15 seconds. This action is accomplished smoothly, without clattering or any indication that power was reversed too abruptly.

l. While the record is playing, operate the Remote Control Unit switches and controls as follows:

(1) VOLUME from 0 to 10: Volume increases with clockwise (cw) rotation.

(2) BALANCE from extreme ccw position to extreme cw position: With control at maximum ccw position, the right channel is muted and maximum audio output emanates from the left channel; audio output balanced between speakers with control at 0; left channel muted and maximum audio output emanates from right channel with control in extreme cw position.

(3) TREBLE from MIN. to MED., then MAX.: Increasing emphasis is placed on high tones.

(4) BASS from MIN. to MED., then MAX.: Increasing emphasis is placed on low tones.

m. Adjust Remote Control Unit for desired audio output and allow the record to complete its play cycle. Observe that the record returns to the holder and the carriage head searches for the next preselected record.

n. While the record is playing, mute one channel and set both Audio Amplifier RECORD-QUALITY-COMPENSATOR switches from MIN. to MED., then MAX.; repeat with the other channel muted. Observe that setting the switch to MIN. emphasizes treble and de-emphasizes bass, setting it to MED. reproduces sound as recorded, and setting it to MAX. emphasizes bass and de-emphasizes treble.

o. Depress the REJECT button on the back of the cabinet. Observe that the record is returned to the holder and the carriage head searches for the next preselected record.

p. While the third selection is playing, depress the RECORD-REJECT button on the Remote Control Unit. Observe that the record is returned to the holder and the carriage head searches for the last preselected record. After the record is extracted from the holder but before the tone arm reaches the record surface, perform step q.

q. Select any film. Observe that all record player action stops and the preselected film is searched for and played.

r. Reject the film. Observe the following:

(1) The film is properly rejected.

(2) The film basket searches for further preselected films.

(3) With the film memory containing no further selections, the fourth record selection begins to play.

s. Reject the record. Observe that the record is properly returned to the holder and the record carriage searches the record memory bar twice before coming to rest at the right of the record player.

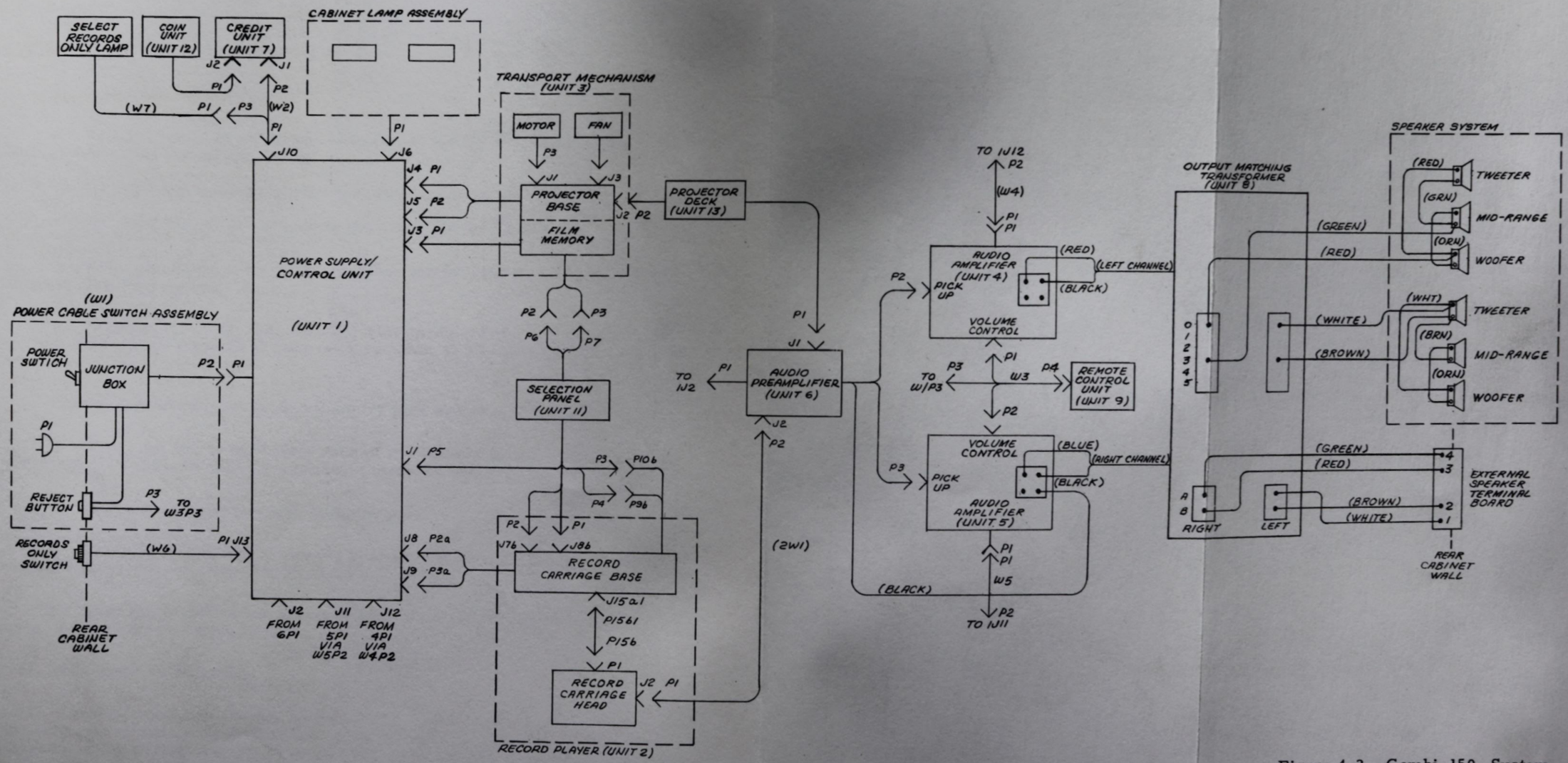


Figure 4-2. Combi-150, System Interconnecting Wiring Diagram

4-16. SELECTION-MEMORY CHECK.

a. Depress the Service Credit switch eight times in slow succession.

NOTE

For convenience sake, credit will be entered in 16-step amounts (8 pulses of the Service Credit switch), since the Credit Unit's capacity is approximately 30 steps (15 pulses of the Service Credit switch).

b. Select films X8 through X1.

c. Repeat step a. twice more, selecting films XR through XJ, then XH through XA. Observe the following:

(1) No record memory selection pins are raised.

(2) All 24 films are played in the order X8 through XA.

d, While the films are playing, depress the Service Credit switch eight times in slow succession.

e. Select records A1, B2, C3, D4, etc. through H8. Observe that only those record memory selection pins corresponding to the selected records are raised.

f. Depress the raised record memory pins and repeat step d.

g. Select any one record from each of the remaining eight letter groups (J through R). Observe that the applicable memory pins are raised.

h. Depress all raised record memory pins.

i. Reset the 1-2 credit subtract switches to their original positions (as recorded in the Search-Play-Reject check).

j. After the last film has played and the Combi-150 assumes its stand-by mode, set the Power switch to OFF.

4-17. TROUBLE ANALYSIS.

4-18. Table 4-1 contains trouble analysis data, detailing abnormal indications, probable cause, and corrective action at the on-site service level. A system interconnecting wiring diagram (Figure 4-2) is provided to aid in localizing malfunctions due to improper or poor electrical connections, and to facilitate the removal and replacement of those items requiring the disconnecting of cables.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	COIN SYSTEM	
Quarters do not pass into coin return cup when system is de-energized.	a. Coin entrance and exit chutes are not aligned properly with the coin mechanism.	a. Check alignment of parts.
	b. Coin entrance and/or exit chutes are blocked.	b. Check the chutes and remove any obstruction.
All quarters drop into the coin return cup when the system is energized.	The coin lockout solenoid is not energizing due to:	
	a. Poor connection between the solenoid, cable assembly W2, and J10 on the Power Supply/ Control Unit.	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Blown fuse F5 (5 amp), F6, and/or F7 (both 10 amp).	b. Replace blown fuse with one of the specified rating.
	c. Defective bridge rectifier BR1 in Power Supply/Control Unit, or defective lockout solenoid.	c. Disconnect W2 from J10 on the Power Supply/Control Unit. Energize the system and check for 30 vdc across J10 pins 13 and 15. If present, replace the Coin Unit. If not, replace the Power Supply/Control Unit.
Depressing Coin Reject button does not return defective quarters.	a. Coin entrance and/or exit chutes are blocked.	a. Check the chutes and remove any obstruction.
	b. Coin entrance and/or exit chutes are not aligned properly with the coin mechanism.	b. Check alignment of parts.
	c. Coin Reject button, the right-angled reject lever, and coin mechanism are not aligned properly.	c. The reject lever screw should be adjusted so that the vertical leg of the lever rests against the end of the Coin Reject button, and the head of the screw rests on the coin mechanism wiper operating lever.
	d. Defective coin mechanism.	d. Replace the Coin Unit.
Coin counter does not register inserted quarter.	a. If the Two Credit lamp lights, the counter is defective.	a. Replace the Coin Unit.
	b. If the Two Credit lamp does not light, refer to that symptom for probable cause.	

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	CABINET LIGHTING	
Cabinet lamps do not light when system is energized.	a. Poor connection between the line cord and power source, or lamp plug and J6 on the Power Supply/Control Unit.	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Blown fuse F3 (2 amp) or F7 (10 amp).	b. Replace blown fuse with one of identical rating.
	c. Cabinet lamps are improperly seated in their receptacles, or are defective.	c. Check seating of lamps; replace defective lamp.
Cabinet lamps do not dim during film play, or they go out during film play.	Lamp dimming circuit in Power Supply/Control Unit defective.	Replace the Power Supply/ Control Unit.
	CREDIT SYSTEM	
Quarter passes into coin box but the Two Credit lamp does not light (SELECT 2 SINGLES OR 1 FILM OR ALBUM lamp).	a. Poor connection between: J10 (Power Supply/Control Unit) and J1 (Credit Unit); J1 (Power Supply/Control Unit) and P5 (Selection Panel); P2 (Selection Panel) and P7b (Record Carriage Base); P7b and P3a (Record Carriage Base); P3a (Record Carriage Base) and J9 (Power Supply/Control Unit); or J2 (Credit Unit) and P1 (Coin Unit).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Two Credit lamp is defective.	b. If selection can be made, replace lamp.
	c. Coin Accept microswitch is defective.	c. If depressing the Service Credit switch establishes credit, replace the Coin Unit.
	d. Defective add solenoid or credit transfer switch in the Credit Unit.	d. Replace the Credit Unit.
Quarter lights One Credit lamp only (WHEN LIT SELECT SINGLES ONLY lamp).	Defective Credit Unit.	Replace the Credit Unit.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	CREDIT SYSTEM (Cont)	
Free play (Two Credit lamp goes out after selecting an album, but One Credit lamp lights).	a. The 1-2 credit subtract switch for the album letter group is incorrectly set to position 1.	a. Set the credit subtract switch to position 2.
	b. Defective Credit Unit.	b. Replace the Credit Unit.
Lost play (Two Credit lamp goes out after selecting a single, but One Credit lamp does not light).	a. The 1-2 credit subtract switch for the single selection letter group is improperly set to position 2.	a. Set the credit subtract switch to position 1.
	b. Defective Credit Unit.	b. Replace the Credit Unit.
	SELECTION PANEL	
Selection Panel keys will not lock in when depressed.	a. Poor connection between P2 (Selection Panel) and P7b (Record Carriage Base), P7b and P2a (Record Carriage Base), or P2a and J8 (Power Supply/ Control Unit).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Defective latch bar solenoid.	b. Check solenoid for open coil or obvious mechanical defects. If defective, replace the Selection Panel.
	c. Mechanical defect in Selection Panel keys.	c. Replace the Selection Panel.
Selection Panel keys do not return to undepressed position after selection is made.	a. Record Player WM motor contact N4b is not opening due to defective contact or defective WM motor camshaft.	a. Manually rotate the WM motor camshaft counterclockwise once and observe that contact N4b opens. If not, and neither the contact nor camshaft can be readily repaired, replace the Record Player.
	b. The latch bar solenoid extension spring is disconnected, missing, or has lost its tension.	b. Reconnect or replace the spring.
	c. The compression spring for the applicable Selection Panel key is missing or has lost its resiliency.	c. If the spring can not be repaired or replaced, replace the Selection Panel.
	RECORD SELECTION-MEMORY SYSTEM	
Selected record is not searched for.	a. Poor connection between: P1 (Records Only switch) and J13 (Power Supply/Control Unit);	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	RECORD SELECTION-MEMORY SYSTEM (Cont)	
	J5 (Power Supply/Control Unit) and P2 (Projector Base); J8 (Power Supply/Control Unit) and P2a (Record Carriage Base); or P15b (Record Carriage Base) and P1 (Record Carriage Head).	
	b. Records Only switch contacts are dirty or defective.	b. Disconnect P1 from J13 on Power Supply/Control Unit. Check for continuity between P1 pins 1 and 2 (with switch in FILM & RECORDS position), then P1 pins 1 and 3 (with switch in RECORDS ONLY position). If defective and needed repairs can not be made, replace the Records Only switch assembly.
	c. Film basket is not seated properly at the bottom of the Transport Mechanism, or the film basket limit switch is defective.	c. Push the film basket down as far as it will go. If the problem does not clear up, de-energize the system and disconnect P2 (Projector Base) from J5 (Power Supply/Control Unit). Check for continuity between P2 pins 8 and 10. If the microswitch is defective and can not be repaired, replace the Transport Mechanism.
	d. SCAN SWITCH in the Record Carriage Base is defective.	d. Disconnect P2a from J8 (Power Supply/Control Unit), and P1 from P15b (Record Carriage Base). Manually activate the SCAN SWITCH and check for continuity between P2a-1 and P15b-1. If defective and needed repairs can not be made, replace the Record Player.
	e. REVERSING SWITCH in the Record Carriage Base is defective.	e. De-energize the system and measure continuity between the middle (gray wire) and lower (blue wire) REVERSING SWITCH contacts. Then, with the Record Carriage Head at the left of the carriage base, or the brass tab above the position solenoid in its extreme left position, measure continuity between the middle (gray

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	RECORD SELECTION-MEMORY SYSTEM (Cont)	
		wire) and upper (violet wire) contacts. If the switch is defective and needed repairs can not be made, replace the Record Player.
	f. Either the SAFETY switches or the COUPLING SOLENOID (Record Carriage Head), or K7 in the Power Supply/Control Unit is defective.	f. Disconnect P1 (Record Carriage Head) from J8 (Power Supply/Control Unit) and check for continuity between P1 pins 1 and 5. If no continuity, replace the Record Carriage Head. If continuity exists, replace K7.
	g. The Record Carriage Head motor is bound up or defective.	g. Relieve binding by loosening the screw on the right exterior of the motor. If the motor is otherwise defective and can not be replaced easily, replace the Record Carriage Head.
Record select-play motor does not reverse direction slowly during search.	a. One or both reversing delay switches in the Record Carriage Base are defective.	a. Connect a meter across the terminals of the switch at the left of the Record Carriage Base. An open condition should exist when either switch is manually activated. If either switch is defective and can not be repaired, replace the Record Player.
	b. Reversing delay circuit in the Power Supply/Control Unit is defective.	b. Replace the Power Supply/Control Unit.
Selected record searched for but not played.	The applicable record memory pin is not raised due to:	
	a. Poor connection between: J10 (Power Supply/Control Unit), cable assembly W2, and J1 (Credit Unit); J1 (Power Supply/Control Unit) and P5 (Selection Panel); P4 (Selection Panel) and P9b (Record Carriage Base); P10b (Record Carriage Base) and P3 (Selection Panel); P2 (Selection Panel) and J7b (Record Carriage Base); or	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	RECORD SELECTION-MEMORY SYSTEM (Cont)	
	P3a (Record Carriage Base) and J9 (Power Supply/Control Unit).	
	b. The applicable Selection Panel letter key or Record Player letter solenoid is defective.	b. If any record from the remaining 15 letter groups can be selected and played, de-energize the system and remove the credit switch cover. Depress the applicable letter key and check for continuity across the record select contacts. If defective and needed repairs can not be made, replace the Selection Panel. Disconnect Selection Panel plug P5 from J1 on the Power Supply/Control Unit. Depress the letter key and check for continuity across P5 pins 3 and 12. If defective and needed repairs can not be made, replace the Record Player.
	c. Record Player WM motor contact N1a is dirty or defective.	c. Check for continuity across N1a by manually rotating the camshaft once counterclockwise. If defective and needed repairs can not be made, replace the Record Player.
	d. Power Supply/Control Unit relay K8, K9, or K10 defective.	d. De-energize the system and withdraw the Power Supply/Control Unit so that access is gained to the relay sockets. Check for continuity across pins 3 and 11, and 4 and 12 of K8 and K9. If open exists, replace the defective relay. If continuity exists, replace K10.
A record other than the one selected plays.	a. Poor connection between P1 (Selection Panel) and J8b (Record Carriage Base).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. The applicable Selection Panel number key is defective.	b. De-energize the system and remove the credit switch cover. Depress the number key and check for continuity across the record select contacts. If defective and needed repairs can not be made, replace the Selection Panel.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	RECORD SELECTION-MEMORY SYSTEM (Cont)	
	c. The applicable position board contact is dirty or defectively wired.	c. Clean the contacts and check the wiring to the contact board. If defects can not be repaired, replace the Record Player.
	d. Either the position solenoid is defective or WM motor contact N2 is not making electrical contact.	d. De-energize the system and check for continuity across WM motor contact N2 by manually rotating the camshaft once counterclockwise. If an open exists and repairs can not be made, replace the Record Player. If continuity exists, the position solenoid is defective. If it can not be replaced, replace the Record Player.
	FILM SELECTION-MEMORY SYSTEM	
Selected film is not searched for.	a. Poor connection between: P1 (Records Only switch) and J13 (Power Supply/Control Unit); J5 (Power Supply/Control Unit) and P2 (Projector Base); J4 (Power Supply/Control Unit) and P1 (Projector Base); J1 (Projector Base) and P3 (film cartridge movement motor).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Records Only switch contacts are dirty or defective.	b. Disconnect P1 from J13 on the Power Supply/Control Unit. Set the Records Only switch to FILM & RECORDS and check for continuity between P1 pins 1 and 2. If defective and needed repairs can not be made, replace the Records Only switch assembly.
	c. Film basket limit switch is defective.	c. Disconnect P2 (Projector Base) from J5 (Power Supply/Control Unit). Manually elevate the film basket and check for continuity between P2 pins 8 and 9. If continuity does not exist and needed repairs can not be made, replace the Transport Mechanism.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	FILM SELECTION-MEMORY SYSTEM (Cont)	
	d. Relay K4, K5, K13, or K14 (Power Supply/Control Unit) are defective.	d. Check the relays, one at a time, by substituting known good relays and selecting a film. Replace any defective relay.
	e. Film basket drive gear system is mechanically defective.	e. Check that the belts connecting the motor planetary gears, and basket drive gear have not broken or slipped off of the proper gears. Check that the gears mesh properly and that there is no obvious gear damage. If defects can not be repaired easily, replace the Transport Mechanism.
	f. Film cartridge drive motor is defective.	f. Disconnect P3 from J1 (Projector Base). Check motor winding across P1 pins 1 and 2, and across pins 3 and 2.
	g. The film cartridge transport safety switch is defective.	g. Disconnect P2 (Projector Deck) from J2 (Projector Base). De-energize the system and check for continuity between P2 pins 1 and 12. If the switch is defective and needed repairs can not be made, replace the Projector Base.
	h. The film cartridge transport safety circuit in the Power Supply/Control Unit is defective.	h. Withdraw the Power Supply/Control Unit and check Q1 on TB1. If defective and it is not replaced easily, replace the Power Supply/Control Unit.
Film basket elevates to uppermost position, but does not reverse and search downward.	a. Poor connection between P1 (Film Memory Unit) and J3 (Power Supply/Control Unit).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Reversing contacts at top of Film Memory Unit are dirty or defectively wired.	b. Clean the contacts and check wiring. If any needed repair can not be made, replace the Film Memory Unit.
	c. Film basket finger contacts are dirty, defective, or not aligned properly with the memory board contacts.	c. Clean the contacts and check for obvious defects and alignment. If repairs can not be made, replace the Transport Mechanism.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	FILM SELECTION-MEMORY SYSTEM (Cont)	
	d. Relay K13 (Power Supply/Control Unit) did not "flip" to the down mode or is otherwise defective.	d. Remove, but do not disconnect, the Power Supply/Control Unit sufficiently to gain access to K13. Manually flip K13 to the down position. If the basket still does not scan downward, replace K13.
Selected film is searched for, but not shown.	a. Poor connection between: P6 (Selection Panel) and P2 (Film Memory Unit); P7 (Selection Panel) and P3 (Film Memory Unit); P1 (Film Memory Unit) and J3 (Power Supply/Control Unit); or J8 (Power Supply/Control Unit) and P2a (Record Carriage Base).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Applicable Selection Panel letter or number key is defective.	b. De-energize the system and remove the credit switch cover. Depress the applicable letter/number key and check for continuity across the film select contacts. If defective and needed repairs can not be made, replace the Selection Panel.
	c. Power Supply/Control Unit relay K10 contacts 2 and 10, or K11 contacts 4 and 6 are dirty or defective.	c. Remove the relays and check for continuity across the specified contacts. Replace defective relay.
	d. WM motor contact N1b is dirty or defective.	d. De-energize the system. Manually rotate the WM motor camshaft once counterclockwise, and check for continuity across contact N1b. If defective and needed repairs can not be made, replace the Record Player.
	e. Defective film memory capacitor or memory board contacts.	e. If other films can be shown and the memory board contacts are clean, replace the Film Memory Unit. If no selected film is shown, refer to the following "Fault Indication".

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	FILM SELECTION-MEMORY SYSTEM (Cont)	
All films are searched for but none are shown.	Film select solenoid does not lock the film basket in place due to:	
	a. Poor connection between P1 (Projector Base) and J4 (Power Supply/Control Unit).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Relay K6 (Power Supply/Control Unit) contacts 6 and 10 are dirty or defective.	b. Substitute a known good relay and select a film. Replace relay if defective.
	c. Bridge rectifier BR3 (Power Supply/Control Unit) is defective.	c. Remove, but do not disconnect, the Power Supply/Control Unit sufficiently to gain access to BR3. Check condition of diodes. Replace Power Supply/Control Unit if BR3 is defective and can not be replaced easily.
	d. Poor connection between the film select solenoid, terminal board TB1, and P1 (Projector Base), or the solenoid is defective.	d. Check connections for defective wiring and TB1 for broken or cold solder joints. It will be necessary to remove the projector deck. If any defects can not be repaired, replace the Transport Mechanism.
A film other than the one selected is shown.	The film select solenoid winding is overheated, due primarily to repeatedly rejecting films.	If it is necessary to reject films in succession, allow approximately 1-1/2 minutes between rejections. Otherwise, the solenoid winding will overheat and the solenoid will take progressively longer to react to commands.
	RECORD PLAY-REJECT SYSTEM	
A record is selected and placed on the turntable, but rejects before play begins.	a. Relay K7 (Power Supply/Control Unit) contacts 9 and 5 do not open when relay is de-energized.	a. Substitute a known good relay and reselect the record. Replace K7 if defective.
	b. Either the Record Carriage Head operate switch does not open when the tone arm reaches the record surface, or the carriage head reed switch is closed (normally open until end of play).	b. Replace the Record Carriage Head.
Turntable does not operate when tone arm reaches record surface.	a. Poor connection between K7 contact 2 and transformer T1 terminal 2.	a. Check connection. If defective and repairs can not be made, replace the Power Supply/Control Unit.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	RECORD PLAY-REJECT SYSTEM (Cont)	
	b. Relay K7 contacts 10 and 2 are dirty or defective.	b. Remove K7 and check for continuity between the specified contacts. Replace K7 if defective.
Record does not reject at the end of play.	a. The tone arm does not follow the end-of-record groove in far enough to close the reed switch.	a. Depress either the cabinet REJECT button or Remote Control Unit RECORD-REJECT button.
	b. The reed switch is defective.	b. Replace the Record Carriage Head.
Records do not reject when the cabinet REJECT button is depressed.	a. Poor connection between P2 (Power Cable Switch) and P1 (Power Supply/Control Unit).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Relay K2 (Power Supply/Control Unit) is defective.	b. Check by substituting a known good relay, selecting a record, and rejecting it. Replace K7 if defective.
	c. REJECT button is defective.	c. Disconnect W1P3 from W3P3 on the Remote Control Unit cable. De-energize the system. Depress the REJECT button and check for continuity between W1P3 pins 1 and 3. If the button is defective and needed repairs can not be made, replace the Power Cable Switch Assembly.
Records do not reject when the RECORD-REJECT button on the Remote Control Unit is depressed.	a. Poor connection between W3P3 (Remote Control Unit) and W1P3 (Power Cable Switch Assembly).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Remote Control Unit reject circuit is defective.	b. Disconnect W3P3 from W1P3. De-energize the system. Depress the RECORD-REJECT button and observe continuity between W3P3 pins 1 and 3. Replace the Remote Control Unit if defective.
Records play at the wrong speed.	Mechanical defect in the speed-changing system.	Replace the Record Carriage Head.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	FILM PLAY-REJECT SYSTEM	
Cartridges continually hang up upon entering Projector Deck.	a. The Projector Deck is not aligned properly with the film basket.	a. Loosen the two screws on each side of the Projector Deck which secure the deck to the Transport Mechanism. Select one or more films for play and position the deck to receive the cartridges. Tighten and glyptol the screws.
	b. The cartridge drive gear assemblies (one on each side of the Projector Base) are not adjusted equally, thereby drawing the cartridge onto the deck at an angle.	b. Select one or more films for play. Adjust one or both cartridge drive gear assemblies until the cartridges are drawn onto the Projector Deck at the proper angle and speed. Adjustment is accomplished by moving the two nuts up or down the drive gear shaft. Glyptol the nuts after final adjustment is obtained.
Film cartridge hangs up on Projector Deck, projector continues to operate.	a. The film cartridge transport safety switch does not open when the white cam is depressed.	a. Disconnect P2 (Projector Deck) from J2 (Projector Base). De-energize the system and depress the white cam on the Projector Deck. Continuity should not exist between P2 pins 1 and 12. If the switch is defective and can not be repaired, replace the Projector Deck.
	b. Relay K14 (Power Supply/Control Unit) contacts 12 and 8 do not open when K14 is de-energized.	b. Remove K14 and check that an open condition exists across the specified contacts. Replace K14 if defective.
	c. Film cartridge transport safety circuit in Power Supply/Control Unit is defective.	c. Withdraw Power Supply/Control Unit sufficiently to gain access to terminal board TB1. Check Q1. If defective and repairs can not be made, replace the Power Supply/Control Unit.
Film cartridge does not travel completely onto Projector Deck, but does pass completely over the cam-operated safety switch.	a. A bubble has developed on that portion of the cartridge facing the projection lamp.	a. Reject the cartridge and check for the bubble. If the bubble can not be filed down, replace the cartridge.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	FILM PLAY-REJECT SYSTEM (Cont)	
	b. The film cartridge drive gears do not draw the cartridge onto the deck fast enough.	b. Select one or more films for play. Adjust the cartridge drive gear assemblies until the film cartridges are drawn onto the Projector Deck properly. Glyptol the nuts after completing adjustment.
Projection lamp does not light.	a. Poor connection between: J4 (Power Supply/Control Unit) and P1 (Projector Base), or J2 (Projector Base) and P2 (Projector Deck).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Fuse F4 (Power Supply/Control Unit) is blown.	b. Replace blown fuse with one of specified rating.
	c. Relay K4 (Power Supply/Control Unit) contacts 11 and 3 are dirty or defective.	c. Remove K4 and check that continuity exists across contacts 11 and 3. Replace K4 if defective.
	d. Relay K14 contacts 10 and 6, or 11 and 7 are dirty or defective.	d. Substitute a known good relay for K14 and select a film. Replace K14 if defective.
	e. The projection lamp is defective.	e. Replace the lamp.
Ventilating fan does not operate.	a. Poor connection between: J4 (Power Supply/Control Unit) and P1 (Projector Base); or J3 (Projector Base) and ventilator plug.	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.
	b. Relay K4 contacts 9 and 1 are dirty or defective.	b. True only if the film movement motor is not moving either. Replace K4 if defective.
	c. Defective ventilator.	c. Replace the ventilator fan.
Film does not play (projection lamp lights and ventilating fan operates).	a. Poor connection between: J4 (Power Supply/Control Unit) and P1 (Projector Base); or J2 (Projector Base) and P2 (Projector Deck).	a. Check for defective connectors and wiring. Ensure that the proper connectors mate securely.

TABLE 4-1. ON-LOCATION SYSTEM TROUBLE ANALYSIS (Cont)

FAULT INDICATION	PROBABLE CAUSE	CORRECTIVE ACTION
	FILM PLAY-REJECT SYSTEM (Cont)	
	b. The flywheel drive belt is stretched or missing.	b. Remove the Projector Deck and inspect the drive belt. If it is obviously stretched or damaged, replace the belt.
	c. The film movement motor is defective.	c. Disconnect Projector Deck plug P2 from J2 on the Projector Base. Check the motor winding across P2 pins 2 and 10. If the motor is defective and can not be repaired, replace the Projector Deck.
Film does not play (projection lamp does not light and ventilating fan does not operate).	The control microswitch on the Projector Base is defective in the normally open position.	If the film cartridge can not be rejected by depressing the RECORD-REJECT button (Remote Control Unit) or the Film Service reject button (Projector Base), the switch is defective. If repairs can not be made by removing the Projector Deck, replace the Transport Mechanism.

4-19. REMOVAL AND REPLACEMENT.

4-20. CREDIT UNIT.

a. To remove the Credit Unit:

(1) Remove the two multiconnector plugs from the Credit Unit jacks.

(2) Remove the Phillips head screw that holds the tie-down bracket in place, and remove the bracket.

(3) Slide the Credit Unit forward in the cabinet and out of its retainer channels.

b. To replace the Credit Unit, reverse the above procedure. Ensure that the connectors are aligned with the polarized corners.

4-21. OUTPUT MATCHING TRANSFORMER ASSEMBLY.

a. To remove the transformer assembly:

(1) Loosen the terminal screws at 0, 3, A, and B for each channel, and remove the eight speaker output wires.

(2) Loosen the two terminal screws on each Audio Amplifier, and remove the four output transformer primary wires.

(3) Remove the screw that holds the tie-down bracket in place, and remove the bracket.

(4) Slide the output transformer case upward in the cabinet and out of its retainer channels.

b. To replace the transformer assembly:

(1) Fit the rear edges of the mounting brackets into the output transformer retainer channels, and lower the transformer case into the retainer until it reaches the bottom stop bracket.

(2) Replace the tie-down bracket and screw. Be sure the tie-down bracket holds the transformer firmly against the stop bracket before tightening the screw.

(3) Reconnect the output transformer primary wires to their proper connections on the Audio Amplifiers: the red and black pair to the front amplifier, and the blue and black pair to the rear amplifier. Be sure that the black wires are connected to the terminals marked "BLACK" for proper output phasing. Tighten the terminal screws.

(4) Reconnect the speaker wires to their proper connections on the output transformer: the brown and white pairs to the strip marked "LEFT CHANNEL" and the red and green pairs to the strip marked "RIGHT CHANNEL" as follows:

a. Internal Speakers - Right channel.

1. Red to 0.

2. Green to 3.

b. External Speakers - Right channel.

1. Green to A.

2. Red to B.

c. Internal Speakers - Left channel.

1. White to 0.

2. Brown to 3.

d. External Speakers - Left channel.

1. White to A.

2. Brown to B.

(5) Tighten the terminal screws.

4-22. AUDIO AMPLIFIER.

a. To remove either Audio Amplifier:

(1) Loosen the output terminal screws, and remove the wire pair. Remove the Preamplifier power wire from the front amplifier.

(2) Remove the Preamplifier input plug and the Remote Control Unit plug.

(3) Remove the tie-down bracket screw and the tie-down bracket.

(4) Lift the amplifier out of its retainer channels using the lip at the top of the chassis as a lifting handle.

b. To replace either Audio Amplifier:

(1) Fit the rear edges of the mounting brackets into the amplifier retainer channels, and lower the amplifier into the retainer until it rests against the bottom stop bracket.

(2) Replace the tie-down bracket and screw. Be sure that the tie-down bracket holds the amplifier firmly against the stop bracket before tightening the screw.

(3) Reconnect the wire pair from the output transformer (and the Preamplifier power wire, in the case of the front amplifier only) to the proper output terminals; be sure that the black wire of the pair is connected to the terminal marked "BLACK" for proper output phasing. Tighten the terminal screws.

(4) Reconnect the Preamplifier and Remote Control Unit plugs.

4-23. POWER SUPPLY/CONTROL UNIT (POWER SUPPLY).

a. To remove the Power Supply:

(1) Remove the thirteen plugs from the jacks on top of the Power Supply chassis.

(2) Remove the two screws from the tie-down brackets at the front of the chassis, and remove the brackets.

(3) Withdraw the Power Supply chassis until its mounting brackets are clear of the retainer channels.

(4) Disconnect the captive Power Supply cable from the input power cable.

b. To replace the Power Supply, reverse the above procedure.

4-24. REMOTE CONTROL UNIT.

a. To remove the Remote Control Unit:

(1) Disconnect the plug from the bottom of the Remote Control Unit.

(2) Remove the two wing nuts and lock washers from the captive screws which secure the remote control storage bracket. Remove the bracket and Remote Control Unit.

b. To replace the Remote Control Unit, reverse the above procedure.

4-25. PREAMPLIFIER.

a. To remove the Preamplifier:

(1) Remove the Preamplifier plug from J2 on the Power Supply.

(2) Remove the Record Player and projector input plugs.

(3) Remove the Preamplifier output plugs from the Audio Amplifier jacks and the Preamplifier power wire from the terminal board on the front amplifier.

(4) Loosen the two screws at the top and bottom of the Preamplifier chassis.

(5) Slide the Preamplifier upward until the head of the top screw is in the large opening of the inverted keyhole. Pull the top tab away from the top screw and lift the Preamplifier out of the cabinet.

b. To replace the Preamplifier:

(1) Slide the U-slot in the bottom Preamplifier mounting tab over the head of the lower screw until the head of the upper screw protrudes

through the inverted keyhole opening in the top mounting tab. Slide the Preamplifier further downward until the upper screw shank is flush against the top of the inverted keyhole. Tighten the two screws.

(2) Reconnect the Preamplifier power wire to the front Audio Amplifier terminal board, and tighten the screw.

(3) Reconnect the two Preamplifier output plugs to the respective Audio Amplifier jacks.

(4) Reconnect the Record Player and projector input plugs to the Preamplifier.

(5) Reconnect the Preamplifier plug to J2 on the Power Supply.

4-26. RECORD PLAYER.

a. To remove the Record Player:

(1) Separate and remove the two Selection Panel plugs from the jacks on the left-rear of the record rack (J7b and J8b).

(2) Disconnect the Record Player plugs from J8 and J9 on the Power Supply.

(3) Disconnect the record memory bar cable connectors (wire-mold cable terminators) from their mating connectors.

(4) Disconnect the Record Player output plug from the Preamplifier jack.

(5) Remove the E-rings from the bottom of the four Record Player mounting studs, and remove the four washers and wing nuts.

(6) Lift the Record Player off of its mounting base.

NOTE

The springs and collars of the Record Player shock mounts should remain on the mounting base. Replace those that are accidentally dislodged or removed.

b. To replace the Record Player:

(1) Line up the four mounting studs of the Record Player with the holes in the shock mount collars, and lower the Record Player onto the mounting base through the shock mounts. Check to see that the Record Player floats freely on the shock mounts before further assembly.

(2) Place the four washers, wing nuts, and E-rings on the mounting studs.

NOTE

Do not tighten the wing nuts unless the equipment is to be transported.

(3) Reconnect the Record Player output plug to the Preamplifier input jack.

(4) Reconnect the record memory bar cable connectors to their mating harness plugs.

(5) Reconnect the Record Player power and control plugs to Power Supply jacks J8 and J9.

(6) Reconnect the two Selection Panel plugs to the two jacks at the left-rear of the record rack (J7b and J8b).

4-27. RECORD CARRIAGE HEAD (TURNTABLE).

a. To remove the turntable:

(1) Release the white nylon lock trigger on each side of the turntable by squeezing them, trigger fashion, and carefully lift the forward end of the turntable from its track.

(2) Tilt the rear of the turntable downward and lift the assembly free of the Record Player.

(3) Disconnect the power and signal plugs from the turntable and complete the removal.

b. To replace the turntable:

(1) Connect the power and signal plugs to the jacks on the rear frame of the turntable.

(2) Tilt the rear section of the turntable approximately 15 degrees downward from horizontal, and insert the turntable into the opening of the Record Player main frame until both front bearings are fully in the guide trough.

(3) Allow the carriage to level itself.

(4) Make sure that the two rollers (bearings) at the front are in the trough, that the rear bearing is in its inverted trough, and that the two nylon locks have seated in their locked position.

(5) After installing the turntable, energize the system and depress the SCAN BUTTON (located on the right front corner of the record carriage base) to ensure that the turntable properly scans the record memory bar.

4-28. COIN UNIT.

a. To remove the Coin Unit:

(1) Disconnect the Coin Unit cable from J2 on the Credit Unit.

(2) Remove the cable clamp that secures the Selection Panel harness to the Coin Unit bracket.

(3) Remove the two nuts, lock washers, and flat washers which secure the coin chute bracket to the Coin Unit.

(4) Remove the two screws and nuts that secure the Coin Unit bracket along the bottom.

(5) Remove the two screws and washers that secure the bracket along the top.

b. To replace the Coin Unit, reverse the above procedure.

4-29. SELECTION PANEL.

a. To remove the portion of the Selection Panel containing both credit lamps, Selection Panel keys and switches, and the latch bar solenoid, perform the following:

(1) Remove the Coin Unit (see paragraph 4-28).

(2) Remove the two screws which secure the coin entrance chute to the Selection Panel. Remove the chute.

(3) Disconnect Selection Panel harness plugs P1 and P2 from J8b and J7b, respectively, on the inside-back of the record rack; P3 and P4 from P9b and P10b, respectively, on the record memory bar; P5 from J1 on the Power Supply; and P6 and P7 from the film memory cable.

(4) Remove the two screws and washers which secure the CREDIT SELECTOR cover to the rear of the Selection Panel.

(5) Disengage both credit lamp assemblies from their mounting plate.

(6) Remove the two screws which secure the latch bar solenoid.

(7) Remove the three screws from beneath the row of switches.

(8) Remove the four screws above the row of switches, and withdraw the panel.

b. To replace the Selection Panel, reverse the above procedure.

4-30. TRANSPORT MECHANISM.

a. To remove the Transport Mechanism:

(1) Disconnect Selection Panel harness plugs P6 and P7 from the film memory cable.

(2) Disconnect film memory plug P1 and projector base plugs P1 and P2 from J3, J4, and J5, respectively, on the Power Supply/Control Unit.

(3) Disconnect projector plug P1 from the Preamplifier.

(4) Lower the film basket to the bottom of the Transport Mechanism.

(5) Secure the counterweight at the top of its tube by inserting a screwdriver through the eye of the counterweight.

(6) Disconnect the S-hook from the film basket.

(7) Raise the film basket to its uppermost position and manually lock it in place.

(8) Remove the wing nuts which secure the top and bottom of the mechanism to the rear wall.

WARNING

The Transport Mechanism's shape and weight distribution give it a tendency to fall forward when it is not secured to the right-hand wall. Therefore, the following precautions will be taken while performing steps (9), (10), and (11) to prevent injury to servicing personnel and/or damage to equipment.

Ensure that some force is exerted on the Transport Mechanism to keep it erect and against the right-hand wall.

Remove the rim-clenching blocks, starting with the bottom one first.

(9) Loosen the two rim-clenching blocks along the left side of the mechanism.

(10) Steady the mechanism while removing the four rim-clenching blocks from the right edge of the mechanism.

(11) Carefully withdraw the Transport Mechanism from the cabinet.

b. To replace the Transport Mechanism, reverse the above procedure.

4-31. PROJECTOR.

a. To remove the projector:

(1) Disconnect projector plugs P1 and P2 from the Preamplifier and J2 on the projector base, respectively.

(2) Remove the four screws (two along each side) that secure the projector to the projector base.

(3) Raise the lens end of the projector base above the projector deck, and remove the C-ring that connects a lever beneath the projector (on the near side) to a lever on the projector base. The levers serve to raise and lower the pressure shoe and pinch drive for the audio subsystem tape drive.

(4) Lift the lamp-end of the projector up and withdraw it toward the left side of the cabinet.

b. To replace the projector, reverse the above procedure. Do not tighten the four mounting screws initially. Select a film for play and position the projector so that the film cartridge passes squarely through the cartridge guides and the film properly contacts the film transport devices. When this is accomplished, tighten the four screws.

4-32. FILM MEMORY.

a. To remove the film memory:

(1) Lower the film basket to the bottom of the Transport Mechanism and manually lock it in place.

(2) Disconnect Selection Panel harness plugs P6 and P7 from the film memory cable.

(3) Disconnect film memory plug P1 from J3 on the Power Supply/ Control Unit.

(4) Remove the three bolts and washers that secure the film memory section to the Transport Mechanism.

b. To replace the film memory, reverse the above procedure.

CHAPTER 5
FIELD MAINTENANCE PARTS LIST

5-1. INTRODUCTION. The intent of this chapter is to suggest a basic complement of parts to support the Combi-150 on location; these are parts which, due to their accessibility and ease of replacement, would entail minimum equipment down time during periods of field servicing. The following parts list should be amended as equipment maintenance histories progress to a point where reliability figures can be established for all operating elements of the system, and as a result of the experiences of maintenance personnel servicing the equipment on location. For complete parts location and identification data, refer to the Illustrated Parts Breakdown Manual.

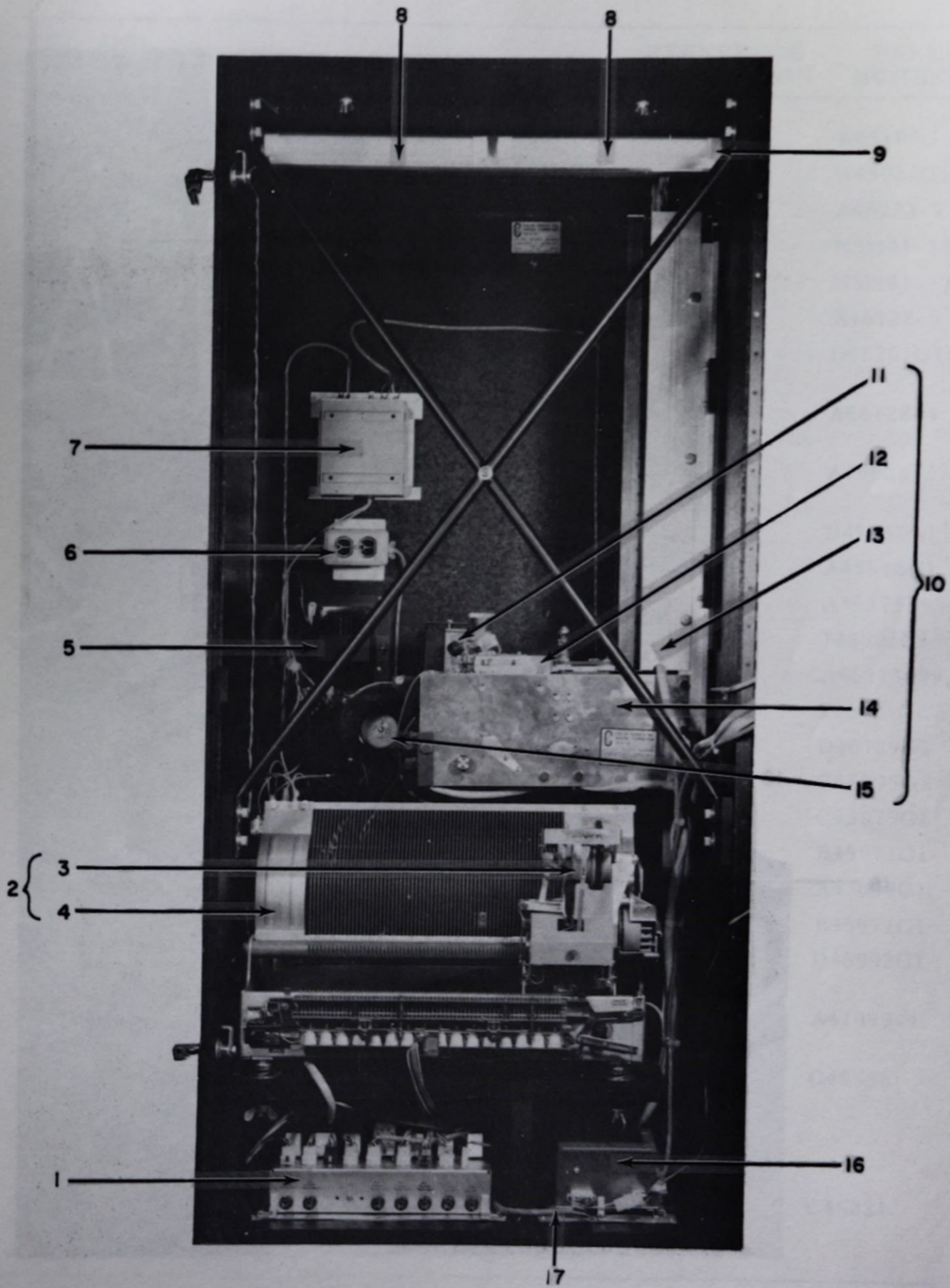


Figure 5-1. Combi-150 Cabinet Assembly, Interior View (Sheet 1 of 2)

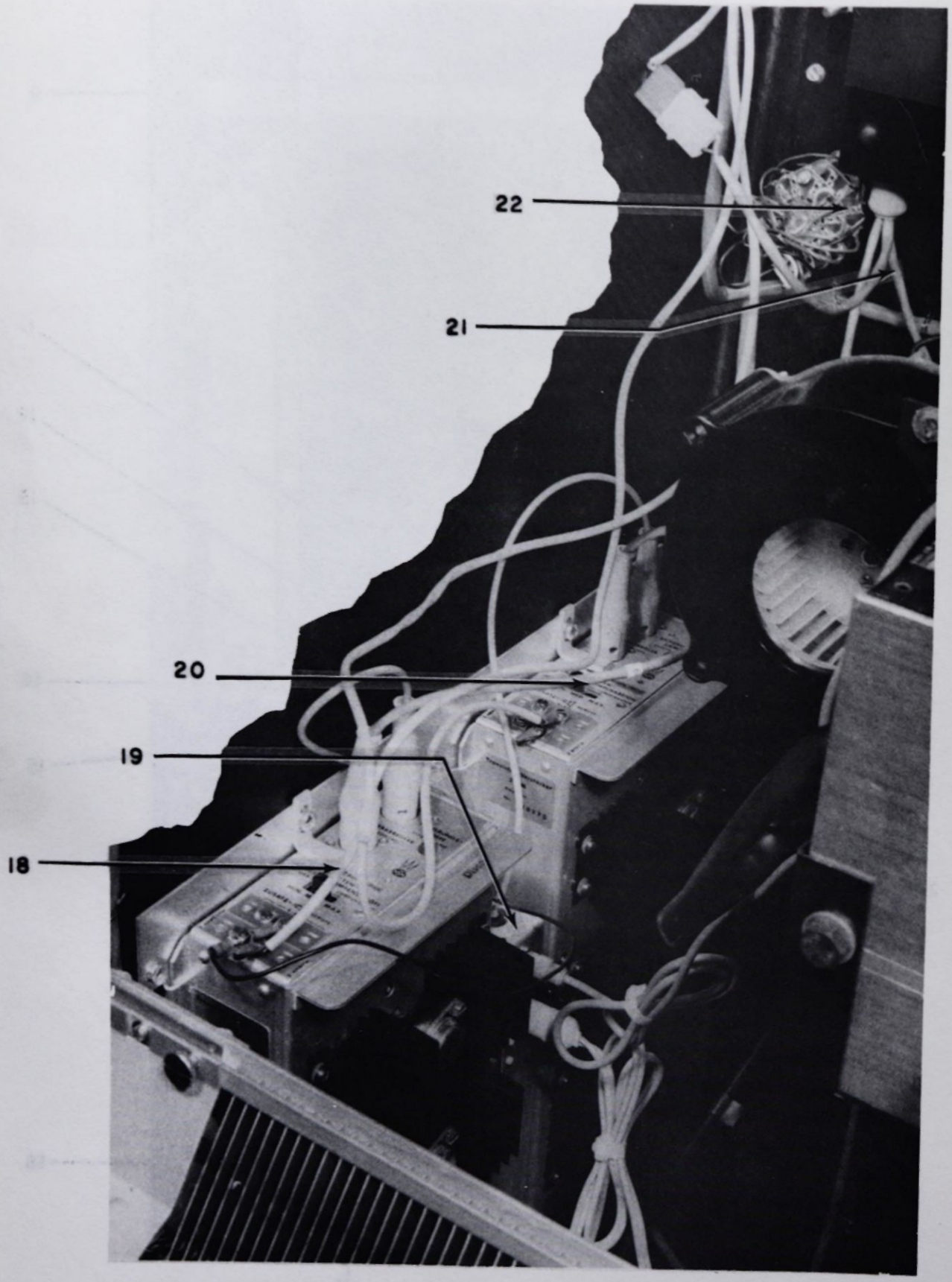


Figure 5-1. Combi-150 Cabinet Assembly, Interior View (Sheet 2 of 2)

FIG. AND INDEX NO.	DESCRIPTION	REFERENCE DESIGNATION	PART NUMBER
5-1-	CABINET ASSEMBLY		A45100G1
-1	POWER SUPPLY/CONTROL UNIT	1	A45024G1
-2	RECORD PLAYER	2	A46122-7
-3	RECORD CARRIAGE HEAD		NSM41-351
-4	RECORD CARRIAGE BASE		NSM41-394
-5	REMOTE CONTROL UNIT	9	A46122-6
-6	POWER CABLE SWITCH ASSEMBLY	W1	D45261G1
-7	OUTPUT MATCHING TRANSFORMER ASSEMBLY	8	A46122-4
-8	INCANDESCENT LAMP, 40 w, 115-125 v		A45522-3
-9	LAMP ASSEMBLY		D45549G1
-10	TRANSPORT MECHANISM	3	A45516G1
-11	PROJECTION LAMP		A46375-134
-12	PROJECTOR DECK	13	J45001G1
-13	FILM MEMORY UNIT		A46373-79
-14	PROJECTOR BASE		J45001G2
-15	PROJECTOR BLOWER	3B2	D46189G1
-16	CREDIT UNIT	7	C45995G1
-17	CREDIT UNIT CABLE ASSEMBLY	W2	C45079G1
-18	AUDIO AMPLIFIER, Left channel	4	B45971G1
-19	PREAMPLIFIER	6	A45059G1
-20	AUDIO AMPLIFIER, Right channel	5	B45971G1
-21	REMOTE CONTROL UNIT CABLE ASSEMBLY	W3	D45992G1
-22	RECORDS ONLY CABLE SWITCH ASSEMBLY	W6	A41999-1
-23	AUDIO AMPLIFIER EXTENDER CABLE (Not shown on Figure 5-1. Connects amplifiers to J11 and J12 on Power Supply/Control Unit.)	W5/W4	C45986
-24	REMOTE CONTROL UNIT EXTENDER CABLE (Not shown on Figure 5-1. Accessory item.)	W8	C46221

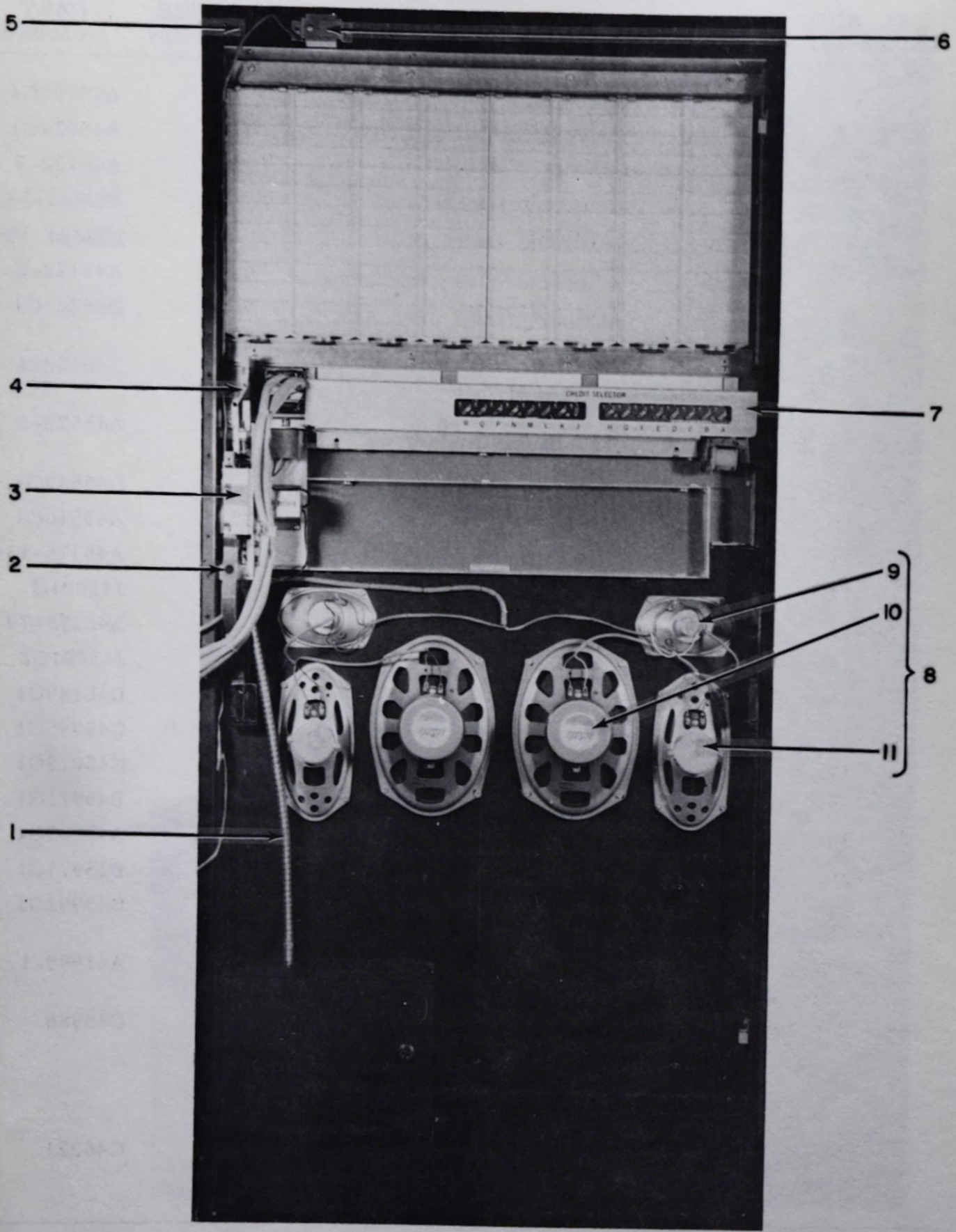


Figure 5-2. Combi-150 Door Assembly, Interior View

FIG. AND INDEX NO.	DESCRIPTION	REFERENCE DESIGNATION	PART NUMBER
5-2-	DOOR ASSEMBLY		E45265G1
-1	COIN CHUTE		B45211G2
-2	COIN RETURN CHUTE		C45504-1
-3	COIN UNIT	12	A45083G1
-4	COIN ENTRANCE CHUTE		C42059G2
-5	SELECT RECORDS ONLY LAMP CABLE ASSEMBLY	W7	C46188G1
-6	INCANDESCENT LAMP, 6 w, 30 v		A46375-23
-7	SELECTION PANEL ASSEMBLY	11	E46125G1
-8	SPEAKER SYSTEM		No Number
-9	TWEETER		A45215-1
-10	WOOFER		A45221-1
-11	MIDRANGE		A45215-2

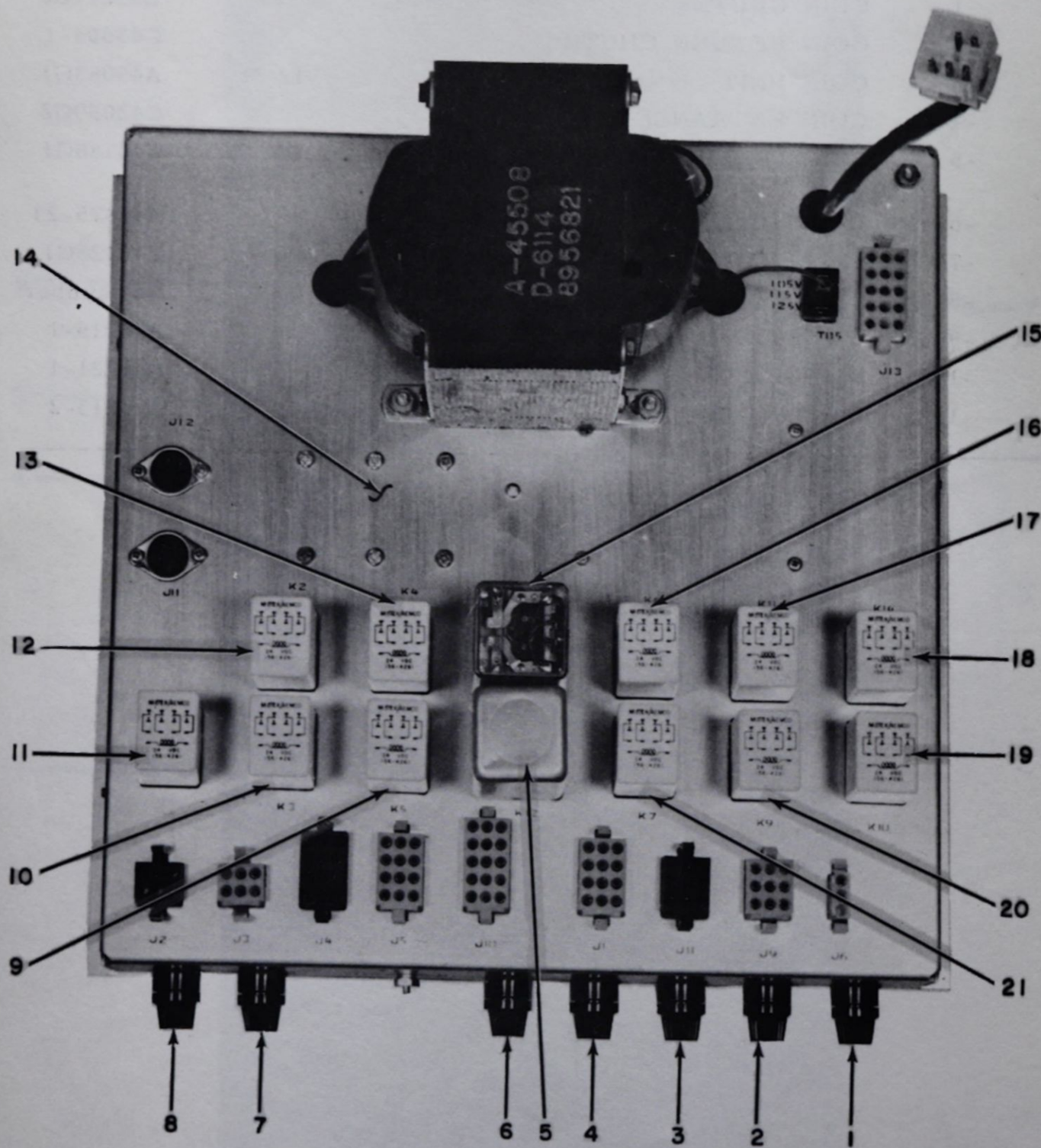


Figure 5-3. Power Supply/Control Unit, Top View

FIG. AND INDEX NO.	DESCRIPTION	REFERENCE DESIGNATION	PART NUMBER
5-3-	POWER SUPPLY/CONTROL UNIT	1	A45024G1
-1	FUSE, 10 amp, 125 v	F7	A46375-75
-2	FUSE, 10 amp, 125 v	F6	A46375-75
-3	FUSE, 5 amp, 125 v	F5	A46375-37
-4	FUSE, 10 amp, 32 v	F4	A46375-38
-5	RELAY, 6 vdc, 200 ohms (Memory sensing)	K12	A46375-62
-6	FUSE, 2 amp, 125 v, Slo-blo	F3	A46375-36
-7	FUSE, 2 amp, 125 v, Slo-blo	F2	A46375-36
-8	FUSE, 2 amp, 125 v, Slo-blo	F1	A46375-36
-9	RELAY, 24 vdc (Record play)	K5	A45039-1
-10	RELAY, 24 vdc (Film reject)	K3	A45039-1
-11	RELAY, 24 vdc (Film slave)	K1	A45039-1
-12	RELAY, 24 vdc (Reject)	K2	A45039-1
-13	RELAY, 24 vdc (Projection)	K4	A45039-1
-14	LATCH RELAY (Up-down)	K13	A45041-1
-15	RELAY, 24 vdc, 2.5 k-ohms (Pulse)	K11	A46375-63
-16	RELAY, 24 vdc (Solenoid)	K6	A45039-1
-17	RELAY, 24 vdc (Numbers)	K8	A45039-1
-18	RELAY, 24 vdc (Safety switch)	K14	A45039-1
-19	RELAY, 24 vdc (Film)	K10	A45039-1
-20	RELAY, 24 vdc (Letters)	K9	A45039-1
-21	RELAY, 24 vdc (Time delay)	K7	A45039-1

WARRANTY

COLOR-SONICS, INC., hereinafter called "Manufacturer", warrants that the equipment here involved is free from defects in workmanship or original material in normal use and operation. In the event any electrical or mechanical component - with the exception of bulbs and fuses - becomes defective within a period of ninety (90) days from shipment of the unit by the Manufacturer, Manufacturer's only obligation hereunder shall be to replace or repair the defective part at no charge to the Buyer.* Bulbs, fuses, resistors, capacitors and similar items of limited and/or unascertainable reliability are furnished with all faults as may be therein. Manufacturer reserves the right to inspect and/or test any part returned hereunder, and the result of such inspection(s) and/or test(s) shall be for all purposes prima facie evidence of the extent of Manufacturer's obligations hereunder.

Claims under this warranty must be made in writing within ninety (90) days after shipment of the equipment hereby covered, time being of the essence. No other warranty either of MERCHANTABILITY OR FITNESS for the purpose intended by the Buyer, whether express or implied, or any other warranty of any kind or otherwise shall apply hereto. No suit or legal proceedings shall be brought hereunder except after timely notice of a claim as above required, and in no event after one (1) year and four (4) months from the date of sale, time being of the essence. The Buyer agrees to return any defective part, shipping charges prepaid, to the Manufacturer and the Manufacturer will return the repaired or replaced part, shipping charges prepaid. Any part returned hereunder must be clearly tagged to show the serial number of the machine from which it was removed. No merchandise of any type shall be returned hereunder without the prior written approval of the Manufacturer.

No representative or person is authorized to assume for the Manufacturer any other liability in connection with the sale of this equipment or to alter, amend or waive this warranty.

Manufacturer reserves the right to make any change in design or to make addition to, or improvements in, this equipment without imposing any obligations upon itself to install them in any equipment previously manufactured, provided that Manufacturer, at its sole option, may repair or replace components with such improved components.

This warranty shall apply to those electrical parts and mechanical parts which are proven defective under normal operating conditions and testing as above provided and have not been subjected to misuse or abuse by others. Under no circumstances will Manufacturer be liable for foreseeable or consequential damages, so-called.

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*As used herein, the term "Buyer" shall mean any person purchasing equipment directly from "Color-Sonics" including, without limiting the foregoing generality, a distributor under any distributor agreement but said term shall not include any person or parties not in privity of contract with Color-Sonics, Inc. As to persons or parties not in privity of contract with Color-Sonics, Color-Sonics disavows any and all warranties or obligations whatsoever.